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BERKELEY COORDINATED TRANSIT DEVELOPMENT PROJECT

By

Wilbur Smith and Associates

&

Curtis Associates

April, 1976

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April 22, 1976

Mr. Thomas Peak
Project Director
Berkeley Coordinated Transit Project
2030 Milvia Street
Berkeley, California

Dear Mr. Peak:

We are pleased to submit herewith, in accordance with the terms of our agreement dated February 25, 1974, the Draft Final Report for the Berkeley Coordinated Transit Project.

There is a clear need for better public transportation for Berkeley. The majority of all trips by Berkeley residents are local, but the existing public transportation system, comprised of A.C. Transit and BART, serves Berkeley mainly by carrying people between the city and other Bay Area locations.

This report recommends an action program for improving public transportation in Berkeley. These improvements are intended to coordinate with the A.C. Transit and BART systems; they also provide better service for neighboring communities in Oakland and Albany. We recognize that this proposal supports the idea of generally giving local service higher public transportation priority. As such, it has implications for service design and the allocation of resources for public transportation throughout the Bay Area.

The recommended program is challenging, if viewed in light of public transportation operation during the last two decades. If it is to provide the best transportation possible, the program will require continuous and critical refining and modification based on the most

up-to-date information available. However, we believe that the program is a positive response to today's need to reduce our dependence on the automobile, while improving personal mobility.

We appreciate the opportunity to assist the Berkeley community, Chris Hoskins and Gregory Thompson, the Project Coordinators, and the many other agencies and individuals who contributed to the analyses and conclusions of this Project. In addition, we wish to acknowledge the assistance provided by Curtis Associates during the course of the Project.

Respectfully submitted,

Wilbur Smith & Associates

summary

PROJECT BACKGROUND

Berkeley is a diverse community extending from the shore of San Francisco Bay east into the hills. It is mainly a residential community with the University of California's Berkeley Campus and associated activities exerting a major influence. Berkeley had a 1970 population of 116,716 which has not changed significantly since the Census. Since no major residential development is planned in Berkeley, it is likely that the population size will remain about the same during the next decade. However, as the social composition of Berkeley continues to change, its resident's travel activity has continued to increase.

Need

The need for improving public transportation in Berkeley arises out of the following situations:

- Travel in Berkeley is increasing and already causes traffic congestion on many of the City's arterial streets.
- The Circulation Section of Berkeley's adopted Master Plan rejects street widening as a solution to traffic congestion, saying in effect: more and more people should travel in the City without their automobiles. To achieve this policy, traffic diverters, street closures and other traffic controls on a number of streets have been installed to control traffic. The effect of the policy will be more congestion on arterial streets and reduced mobility unless alternative transportation is provided.
- Local travel and travel of non-Berkeleyans coming into the City, particularly to the University of California, generate the major

share of the traffic on Berkeley's streets. Existing public transportation does not adequately serve these trips because it is oriented to serve trips made from Berkeley to external destinations (i.e., commuter trips to San Francisco and Oakland).

This project was initiated to develop a program for improved local public transportation in Berkeley; recognizing that better local public transportation must be coordinated with the service provided by A.C. Transit District and the Bay Area Rapid Transit District (BART).

Although Berkeley has had by comparable standards good public transit for many years, transit provides only partial transportation service. The evolutionary development of service has not provided Berkeley with systematic and usable local transit nor has useful public transportation been provided the large numbers of commuters coming into Berkeley from the outside, particularly to U.C. Berkeley. Many trips, particularly short trips within Berkeley cannot be made conveniently on transit.

Study Context

The Berkeley Coordinated Transit Project is one of about 30 transportation studies either planned or in progress in the nine-county San Francisco Bay Region, under the auspices of the Metropolitan Transportation Commission (MTC). Other studies of significance to improving public transportation for Berkeley are the A.C.-BART Coordination Study and study of special transportation needs of the poor, aged and disabled.

RECOMMENDATIONS

The Berkeley Coordinated Transit Project is recommending an extensive action program to improve transit. The program is expensive but affordable, with new financial resources, and potentially can increase transit ridership in Berkeley three times with the help of automobile disincentives.

Route Reorganization

The Project recommends reorganizing local routes from a radial pattern focused on downtown San Francisco and Oakland to a Grid pattern serving local needs. With the reorganization, local transit trips can be made in only slightly more time than it takes to drive. The new routing significantly improves service to the University of California.

Service for the Disabled

Because it appears infeasible to load and unload wheelchairs from regularly scheduled buses which should not dwell longer than a few seconds at any given stop, a demand responsive service for the disabled is recommended. There is a substantial latent need for this service, and providing disabled Berkeleyans with the same mobility as their neighbors could result in increased transit ridership of more than a thousand trips per day.

Fare Policy

The recommended fare policy includes passes, merchant rebates and fare marketing elements.

Shelters

Shelters are recommended at key transfer points and major stops. They should be simple but attractive structures that keep people dry, warm and safe while waiting for the bus. It is recommended that the comprehensive Berkeley Planning Department work with the community to create several designs for shelters and to approve locations.

Bicycle Access

Bicycle access to transit should be encouraged, so that it is convenient for transit riders to bicycle to and from BART or the nearest bus stop. Placing bicycles on buses, except for the special services operated by A.C. Transit, would adversely effect overall service. BART's usefulness should be increased by additional bicycle storage, safe and free to the cyclist (as is BART parking to the motorist), particularly now that BART carries bicycles during off-peak hours. Bicycle lanes to major transit stops and BART stations could also improve access.

ALTERNATIVES SERVICE CONCEPTS

As a basis for recommending transit service improvements for Berkeley, the Project evaluated four alternatives. These are described in Chapter 5. Proposal 1B was for a Grid routing, and was the proposal eventually recommended. In addition, there were proposals for:

Proposal 1A - Hybrid Dial-a-Ride/Fixed Route Service

Four dial-a-ride zones were to provide local and east-west feeder service to fixed route north-south regional A.C. Transit lines.

Proposal 2 - Timed Transfers Fixed Routes

Buses on different lines converged to a common transfer point and waited for one another to exchange transferring passengers. After interchanging passengers, the buses depart along their respective routes.

Proposal 3 - Reinforcing Existing Service

Minor modifications were made to existing A.C. Transit service and headways improved.

EVALUATION

The results of the evaluation of the four proposals and existing transit service were:

Ridership Characteristics

Proposals 1B and 2 were found to provide the best service in terms of travel times. In particular, they vastly decreased the uncertainty of riding transit by providing more constant travel times.

Proposals 1B and 2 have the best ridership characteristics. Proposal 1B operates buses more frequently on routes with better coverage, thus providing the casual rider with generally better service. By coordinating transfers -- the most time consuming part of local transit trips -- Proposal 2 gets the experienced transit rider (who knows when the first bus will go by) to local destinations in about the same time it takes by car, plus 5-15 minutes.

Patronage

Improved service in Berkeley could result in roughly a two-fold increase in local transit travel over the next five years, to about 25,000 trips per average weekday. Overall, transit's share of all automobile and transit travel into and within Berkeley could approach 13-17 percent, if appropriate service improvements are made.

Proposal 1A has the least patronage potential. The generally low level of dial-a-ride service it provides would discourage riders and likely reduce transit's share of local travel to less than 2 percent.

Proposal 3 would likely attract more patronage than existing service but provides less attractive service to the largest potential generators.

Proposal 1B and 2 have the largest patronage potential. This is because both serve dispersed local travel well and are routed to distribute BART riders to important local destinations.

Cost Comparison

The operating cost of the proposals is roughly the same, initially about three million 1975 dollars per year more than the cost of existing service. The capital cost is estimated to be approximately 4.6 million dollars, not including a new maintenance facility needed or the cost of modifications to the Warren-Grove Shafter Freeway interchange.

Community-Environmental Impacts

Increasing transit patronage to and within Berkeley to 2 times today's levels appears possible, and would take enough traffic off the City's arterial streets so that diversion of neighborhood traffic can occur and leave total arterial traffic volumes about the same as today's, at least for the next five years.

The Grid (Proposal 1B) and Timed-Transfer (Proposal 2) alternatives have sufficient patronage potential to help maintain arterial street traffic at today's level.

Beefing up A.C. Transit service (Proposal 3) would have somewhat lower patronage potential, but still have a considerable impact upon traffic levels.

Dial-a-Ride (Proposal 1A) would actually increase traffic on Berkeley's streets, because of its inability to carry large numbers of trips.

Feasibility

With the exception of the Dial-a-Ride proposal, all the proposals for improved transit for Berkeley seem to be affordable. But the proposals vary considerably with regard to operating and

institutional feasibility.

Operation - the Grid proposal is the "cleanest" operationally. East-west routes in the grid can operate independently from north-south A.C. Transit routes. The Timed-Transfer proposal (2) would require A.C. Transit to operate modified and more complicated scheduling on a major part of the East Bay system. Beefed up A.C. Transit service in Berkeley would effect the East Bay system somewhat, but could be implemented by the District using their current operating procedures.

Institutional - The Grid presents clear institutional options. With north-south routes owned and operated by A.C. Transit, the local east-west routes forming the grid could be owned by the City or A.C. Transit and operated by the City, A.C. Transit, the Berkeley Unified School District or privately. Both the Timed-Transfer and Beefed up A.C. Transit proposals would be owned and operated by A.C. Transit as part of the District's overall system, but the City would presumably be asked to pay its share of service improvements. The financial and management arrangements for local contribution to and control of a portion of the larger A.C. Transit system are likely to be complex.

FINANCIAL AND IMPLEMENTATION PROGRAM

The recommended improvements to Berkeley's transit service will cost about eleven million dollars by 1977 and eighteen million dollars by 1980. Part of the cost can come from the increased revenue as more people ride the system, but additional funds must be raised. If Berkeley is to have local transit that is responsive to local needs, the City must explore options for transit ownership and management. To act upon the recommendations contained in this report will require effort in several areas during the next year:

- Neighborhood review
- Conduct sampling on-board survey of existing riders
- Develop a local parking management plan

- Negotiate service contracts with A.C. Transit and Non-profit agency
- Finalize financial plan
- Prepare and submit environmental reports and grant applications
- Initiate service
- Study College-University Avenue corridor needs
- Encourage complementary regional transit improvements
- Monitor the program

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1 project background

The need for improving public transportation in Berkeley arises out of the following situation:

- Travel in Berkeley is increasing and already causes traffic congestion on many of the City's arterial streets.
- The Circulation Section of Berkeley's adopted Master Plan rejects street widening as a solution to traffic congestion, saying in effect: more and more people should travel in the City without their automobiles. To achieve this policy, efforts are underway that discourage traffic through neighborhoods, including placing traffic diverters, street closures and other traffic controls on a number of streets. The effect of this policy will be more congestion on arterial streets unless alternative transportation is provided.
- Local travel and travel of non-Berkeleyans coming into the City, particularly to the University of California, generate a major share of the traffic on Berkeley's streets. Existing public transportation does not adequately serve these trips because it is oriented to serve trips made from Berkeley to external destinations.

This project was initiated to develop a program for improved local public transportation in Berkeley; recognizing that better local public transportation must be coordinated with the service provided by the A.C. Transit District and the Bay Area Rapid Transit District (BART). The program that this report recommends includes a new service design, suggestions for phasing new services into operation, and a variety of community development actions that could complement better public transportation in Berkeley. These and other aspects, as well as a description of how the proposals for improved service were formulated and evaluated, are included in this report.

PROJECT CONTEXT

In the 1960's several transportation studies proposed arterial street widenings and extension of the Bay Area freeway system into Berkeley. Strong community opposition to these proposals led to adoption of a Master Plan policy that, in effect, committed Berkeley to seeking alternatives to automobile travel. This was the basis for establishment in the early 1970's of a bicycle trail system, neighborhood traffic controls, as well as efforts to discourage expansion of parking facilities. The Berkeley Coordinated Transit Project was initiated by the City along with the recently completed Neighborhood Traffic Study, so that local public transportation improvements and citywide action to control automobile traffic in Berkeley would be mutually supportive. At its conclusion, the Project will contribute to the revision of Berkeley's Master Plan.

Project Organization

The Project is under the direction of the Berkeley Transit Coordination Board. The Board is composed of representatives of the City of Berkeley, the Berkeley Unified School District, the University of California, the A.C. Transit District, BART and the Metropolitan Transportation Commission (MTC). Mr. Thomas Peak, Director of the Berkeley City Planning Department, administers the Project for the Board. A committee of Berkeley citizens and a technical committee advise the Project. The consulting firms of Wilbur Smith and Associates and Curtis Associates conducted the technical work. Appendix A of the report describes the project design in detail.

Regional Transportation Planning

The Berkeley Coordinated Transit Project is one of about 30 transportation studies either planned or in progress in the nine-county San Francisco Bay Region, under the auspices of the MTC. Other studies of significance to improving public transportation for Berkeley are the A.C.-BART Coordination Study and study of special transportation needs of the poor, aged and disabled.

All Bay Area transportation studies receiving Federal or State funding are coordinated through MTC, which was formed by the California Legislature in 1970 to plan, coordinate, and guide transportation development in the Bay Area. This regional agency superseded the functions of the Regional Transportation Planning Commission (RTPC) and the Bay Area Transportation Study Commission (BATSC).

The preparation, adoption, and maintenance of a "Regional Transportation Plan" as a continuous regional transportation planning process for the Bay Area is one of MTC's main purposes. To develop and maintain its regional plan, MTC coordinates the transportation planning efforts of Local, State and Federal agencies, and determines the amounts and uses of California Transportation Development Act funds for transit improvements in the Bay Area. MTC is required to review any application from local governments or transportation districts in the region for funds from the Federal or State government if the application contains a transportation element. The Commission must find that the application is compatible with the regional transportation plan before it can be forwarded to the funding sources.

Because of its regional responsibilities, the Metropolitan Transportation Commission is representative of the nine San Francisco Bay Area Counties. Commissioners are selected by mayors' councils and boards of supervisors of each county. Alameda, Contra Costa, San Mateo, and Santa Clara Counties, and the City and County of San Francisco have two commissioners per county. Marin, Napa, Solano and Sonoma Counties have one commissioner each. The Association of Bay Area Governments and the Bay Conservation and Development Commission have one voting member each on the Commission. The State Business and Transportation Agency, the U.S. Department of Transportation, and the U.S. Department of Housing and Urban Development, have one non-voting member on the Commission each.

TRANSIT DEVELOPMENT

For many years, Berkeley was served by an extensive network of streetcars, inter-urban railways and buses. Inter-urban tracks extended from Berkeley across the lower deck of the Bay Bridge to San Francisco. Other streetcars and inter-urban routes connected Berkeley to many destinations in the East Bay and as far away as Sacramento. This system carried more people in the East Bay then than transit does today. The last of the tracks were torn up in the 1950's and the A.C. Transit District was created to take over operation of the bus system serving the East Bay. At the same time, planning for the BART rail rapid transit system began.

Now Berkeley is provided with transit mainly by the A.C. Transit District and BART. Many A.C. Transit bus routes follow the original streetcar and inter-urban lines. Both A.C. Transit and BART are oriented to carry people from Berkeley to destinations outside of Berkeley, particularly downtown Oakland and San Francisco. In addition, some groups within Berkeley are provided their own transit services: the Berkeley Unified School District transports students, and there are several programs to provide some transportation to the disabled and aged.

PURPOSE

Although Berkeley has had by comparable standards, reasonably good public transit for many years, transit provides only partial transportation service. The evolutionary development of service has not provided Berkeley with systematic and attractive local transportation, nor has useful transportation been provided the large numbers of students, workers and shoppers coming into Berkeley. The purpose of the Berkeley Coordinated Transit Project is to improve transit in these two areas.

Berkeley pays for its transit service in several ways. It contributes over one-third of A.C. Transit's annual fare revenue and approximately \$6 million per year from property and sales taxes to subsidize public transportation. The City is trying to find additional sources of support.

As more Federal and State funding for transit becomes available, and as a basis for its own contribution, Berkeley is raising some fundamental questions about the allocation of transit funds: Is local public transportation needed as much or more than the sub-regional and regional services which now receive the majority of funds? What is the better way to improve local service: systematic restructuring of sub-regional routes to provide better local transportation or a completely new local system superimposed on existing service? Can Berkeley be provided with better transit at a cost that can be afforded? What is the combination of local, community and regional service with the greatest benefit per dollar expended? These questions must be addressed before significant improvements can be made to Berkeley's transit service.

REPORT ORGANIZATION

The report is organized as follows: Chapters 2-4 describe Berkeley's needs and opportunities for improved local public transportation; Chapter 5 describes concepts for better service, and Chapter 6 describes the Recommended Action Program and steps required to begin operation. Comments, from the contributing agencies, to the Preliminary Draft Report are appended to the end of the report. A separate appendices document deals with the Project design, socio-economic characteristics, description of existing transit services, patronage, participation in the Project and references.

2 community characteristics

Berkeley is a diverse community extending from the shore of San Francisco Bay east into the hills, as shown in Figure 1. It is mainly a residential town, with the University of California's Berkeley Campus and associated activities exerting a major influence. There is a large industrial area in West Berkeley, and the City has seven principal commercial districts.

Where people live, work, shop, attend school and spend leisure time in Berkeley determines existing travel patterns. Growth and change, as well as transportation improvements, will have implications for future travel. This Chapter briefly describes these determinants; additional information about the Berkeley community is contained in Appendix B.

POPULATION

Berkeley had a population of 116,716 persons in 1970 according to the U.S. Census. A recent 1973 California Department of Finance report indicated no significant change in population has occurred since the 1970 Census. Since no major residential development is planned in Berkeley, it is likely that the population size will remain about the same during the next decade. However, as the social composition of Berkeley continues to change, its resident's travel activity continues to increase.

The people of Berkeley are socially diverse and, on the whole, progressive in supporting programs to meet people-oriented needs. Probably because of the University of California, Berkeleyans have higher incomes and more education on the average than other Bay Area cities. In other respects, Berkeley exhibits many of the population characteristics of core cities.

The Master Plan Revision Program of the City of Berkeley has identified 21 principal neighborhoods in the city. Each individual

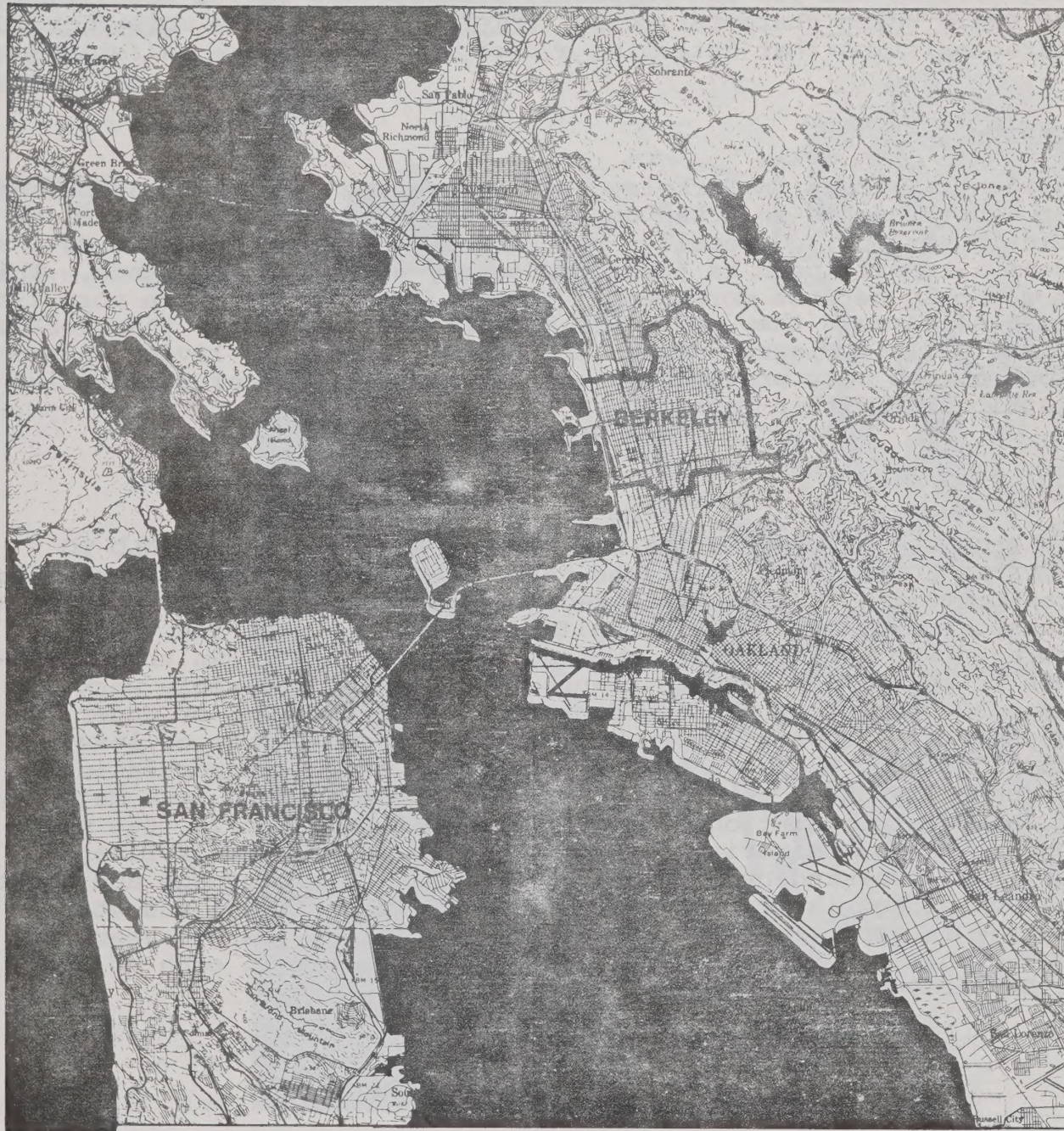


FIGURE 1 REGIONAL SETTING

neighborhood has its own physical, economic and social identity and goals which characterize it. Briefly, some of the main characteristics that determine a need for transit are as follows.

Density

Residential areas in Berkeley have an average density of 39 persons per acre; this is an urban density that justifies a high level of transit service. Generally, the Berkeley Hills do not have as great a transit need as the more densely populated flatlands. This is not only because more people in the flatlands generate more travel, but also because they own fewer automobiles per capita than residents of the hills. Figure 2 shows the number of persons living in each block of the city providing a graphic illustration of residential distribution within Berkeley.

Age

LARGE GROUPS OF BERKELEYANS ARE EITHER TOO YOUNG OR TOO OLD TO DRIVE AN AUTOMOBILE. Both the young and the aged need alternative transportation, particularly secondary school age youths who are not transported by the Berkeley Unified School District and those of the aged who live on their own and must find their own transportation to social and leisure events, shopping and possibly work. About 30 percent of the residents are either over 65 or under 18 years of age with 20 percent being 18 years of age or less and 13 percent 62 years of age or older. The white population is generally older than the non-white population and is a majority of the total population. However, below the age of 20, the white population is a minority population. Almost one out of five of the white non-student population is over 65 years of age and about one out of ten is over 75 years of age. The national and state average is approximately one out of ten persons over 65 years of age. Table 1 describes the age distribution within each of the 21 Berkeley neighborhoods.

FIGURE 2
NEIGHBORHOOD
POPULATION
DISTRIBUTION

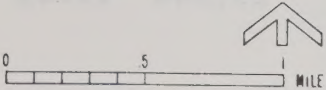
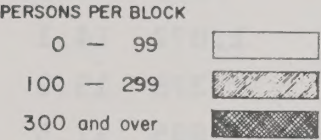


Table 1

NEIGHBORHOOD DISTRIBUTION OF YOUNG AND ELDERLY
Berkeley Coordinated Transit Project

NEIGHBORHOOD	POPULATION							
	Total		Under 5 Years of Age		Under 18 Years of Age		62 Years and Over	
1. West Berkeley	8,330	100%	850	10.2%	2,831	34.0%	679	8.2%
2. Westbrae-Nobbs	7,598	"	533	7.0	1,875	24.7	1,072	14.1
3. Cow Hollow	2,480	"	175	7.1	645	26.0	378	15.2
4. North Berkeley	7,799	"	465	6.0	1,440	18.5	895	11.5
5. Thousand Oaks	6,761	"	421	6.2	1,825	27.0	1,510	22.3
6. Hill	12,334	"	660	5.3	3,167	25.7	1,770	14.5
7. Hillside	3,577	"	192	5.3	640	17.9	649	18.1
8. Northgate	5,741	"	137	2.3	296	5.0	590	10.3
9. Downtown	6,663	"	102	1.5	200	3.0	866	13.0
10. South Campus	8,022	"	37	.5	240	3.0	361	4.5
11. Claremont-Elmwd.	7,175	"	280	3.9	1,938	27.0	1,183	16.5
12. Willard Park	4,301	"	147	3.4	322	7.4	422	9.8
13. Bateman	1,572	"	81	5.1	255	16.2	338	21.5
14. Le Conte	7,058	"	329	4.6	966	13.7	985	14.0
15. Savo Island	2,931	"	204	7.0	708	24.2	271	9.2
16. Flatlands	4,774	"	303	6.3	955	20.0	764	16.0
17. McGee	5,116	"	409	8.0	1,432	28.0	665	12.8
18. Suds	4,333	"	320	7.3	1,432	33.1	665	15.4
19. San Pablo	3,621	"	226	6.2	978	27.0	579	16.0
20. South Berkeley	6,531	"	526	8.0	1,961	30.0	902	13.8
21. Waterfront	Insignificant							
City-Wide	116,716	100%	6,397	5.5%	24,106	20.6%	15,544	13.3%

SOURCE: Berkeley Master Plan Revision

Income

The average income of Berkeley families was reported as \$7,341 by the 1970 U.S. Census with the median income being higher, \$9,983 per year. The median for white families was \$11,118 and for black families \$7,995 per year. ALMOST 25 PERCENT OF THE FAMILIES AND UNRELATED INDIVIDUALS IN BERKELEY HAD INCOMES BELOW THE U.S. CENSUS DEFINED POVERTY LEVEL IN 1970. ALTHOUGH THESE BERKELEYANS CAN NOT AFFORD MUCH, THEY ARE OFTEN FORCED TO SPEND A LARGE SHARE OF THEIR INCOME FOR BASIC TRANSPORTATION NEEDS. The high cost of private transportation also imposes restrictions on the mobility of these families and thus lowers the quality of their lives.

Education

The educational level of Berkeleyans is one of the highest among cities in California; 77 percent of the residents have completed four years of high school and 40 percent have completed four years of college. MANY BERKELEYANS ARE STUDENTS WHO HAVE SPECIAL TRANSPORTATION NEEDS. The almost 30,000 students attending the University of California have lower than average incomes and varied schedules of campus attendance that may not correspond with transit service. The majority of U.C. Berkeley students find it difficult to keep an automobile and drive to campus, and are discouraged from doing so by both University and by City policy. Many Peralta College students living in Berkeley also find transportation difficult, particularly to the Merritt Campus. Although the Berkeley Unified School District buses elementary school children, most students above the elementary level must obtain their own transportation.

Disabled

Various estimates indicate that disabled residents of Berkeley number 12,000 people, more than 10 percent of the city's population. TRANSPORTATION FOR THE DISABLED IS SO INADEQUATE THAT MANY DISABLED BERKELEYANS DO NOT HAVE A PERCEPTION OF WHERE THEY NEED OR WANT TO TRAVEL. Table 2 shows the distribution of disabled persons in Berkeley.

Table 2

NEIGHBORHOOD DISTRIBUTION OF DISABLED
Berkeley Coordinated Transit Project

<u>NEIGHBORHOOD</u>	<u>TOTAL POPULATION</u>	<u>DISABLED POPULATION</u>	<u>PERCENT DISABLED</u>
1. West Berkeley	8,330	840	10.1
2. Westbrae-Nobbs	7,598	821	10.8
3. Cow Hollow	2,480	218	8.8
4. North Berkeley	7,799	756	9.7
5. Thousand Oaks	6,761	547	8.1
6. Hill	12,334	1,075	8.7
7. Hillside	3,577	311	8.7
8. Northgate	5,741	614	10.7
9. Downtown	6,663	674	10.1
10. South Campus	8,022	830	10.4
11. Claremont-Elmwd.	7,175	585	8.2
12. Willard Park	4,301	407	9.5
13. Bateman	1,572	162	10.3
14. Le Conte	7,058	692	9.8
15. Savo Island	2,931	290	9.9
16. Flatlands	4,774	484	10.1
17. McGee	5,116	591	11.6
18. Suds	4,333	461	10.6
19. San Pablo	3,621	420	11.6
20. South Berkeley	6,531	803	12.3
21. Waterfront	Insignificant		
City-Wide	116,716	11,581	9.9%

SOURCE: Berkeley Master Plan Revision

Labor Force

About one-third of Berkeley residents work. Although the University of California, the Western Berkeley Industrial Area and other employment areas have about 46,000 jobs, more than fifteen percent of Berkeley's labor force commutes to Oakland, and twelve percent commute to San Francisco.

Residential Distribution

Generally, higher income residents live in the hill areas, non-white as well as poorer residents mostly live in the flatlands. The elderly are dispersed throughout the city; over one-half of the Berkeley census tracts contain 15 percent or more residents 60 years of age or over. The disabled population of Berkeley are located mainly throughout the flatlands, with a concentration in the south-campus area. University of California students reside in all areas of the city; however, over one-half of the Berkeley U.C. students are clustered in an area bounded by Cedar, Fulton and Dwight Way.

ACTIVITIES

Surveys were made to establish the level of employment and the attraction of clientele to activities in Berkeley, and to locate each activity that employed 20 or more workers. The survey results were used along with City records, information from the Berkeley Chamber of Commerce and contacts with the activities themselves to establish the level and type of employment and clientele in each area of Berkeley. This information was tabulated and mapped according to Berkeley Transit Zones established by the Project. The description of activities was used to estimate travel patterns, and for the design and evaluation of alternative transit proposals. Figure 3 shows the locations of major employment and other activities in the city. Some of the important characteristics are as follows.

**FIGURE 3
MAJOR TRIP
ATTRACTORS**

LEGEND

HOSPITALS

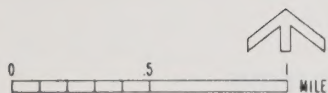
SECONDARY SCHOOLS
UNIVERSITIES

MAJOR
COMMERCIAL AREAS

OUTLYING
EMPLOYMENT AREAS

BART STATIONS

MARKETS



Employment

The University of California and downtown Berkeley together comprise by far the dominant employment concentration in the city. The University employs about 10,000 people and the downtown almost 2,500 people, of whom 2,000 are engaged in the retail trade and service sector. Hinks Department store is the major retail service employer in the downtown, with about 400 employees. The City Hall complex located near downtown has about 2,000 City and County employees and is the major governmental employer. The West Berkeley industrial area is a lineal employment concentration extending the length of Berkeley just east of San Pablo Avenue. Cutter Laboratory, with about 800 employees, is the largest employer in this area. Other employers are scattered along Telegraph, University, San Pablo and Shattuck Avenues, and in Berkeley's seven commercial districts. In total, they represent more jobs than the larger single employer concentrations mentioned earlier. Figure 4 illustrates current employment distribution by analysis zone. The largest community service employers are Herrick and Alta Bates Hospitals, with 800 and 600 employees respectively. In addition to employees, these activities attract sizeable numbers of salesmen, clients and service personnel.

University of California

The University of California has an enrollment of about 30,000 students, nearly three times the number of people it employs. Chapter 4 specifically discusses the University, its transportation needs and its influence on Berkeley.

Commercial and Community Activities

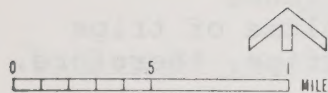
The shopping areas, schools, community facilities and social services shown in Figure 3 are important attractors of non-work trips throughout the day. The seven major commercial districts in Berkeley together contain about 60 percent of Berkeley's retail and service establishments, schools, libraries, day care centers, health facilities and churches. People traveling to these activities throughout the day account for a larger volume of trips than do employees going to and from work. Non-work trips, therefore,

FIGURE 4
DISTRIBUTION
OF EMPLOYMENT

NUMBER
OF EMPLOYEES
3,000
2,000
1,000
0

ZONE NUMBER
ZONE BOUNDARY

20



represent a significant market for public transportation services. Since these non-work trips are not generally as essential, as long and as repetitive as work trips, transit service must be frequent and convenient in order to penetrate the non-work trip market.

3 transit demand

This chapter describes travel within, coming into and traveling outside of Berkeley, as well as latent travel demand. Additionally, existing transit services are described as a basis for identifying possible improvements.

METHOD

The demand for transit in Berkeley was estimated by determining where people want to go and assessing the ability of transit to serve these trips, compared with other modes of travel. The existing service provided by A.C. Transit, BART, BUSD and others, was viewed from the user's perspective.

Travel Patterns

The Regional Transit Travel Projection Project (RTTPP) and the Bay Area Transportation Study were used to estimate the regional origins, destinations and volumes of travel in Berkeley. A more detailed picture of local travel patterns within Berkeley was obtained by using a mathematical estimation developed by the Neighborhood Traffic Study.

This travel information was augmented by the detailed analysis of Berkeley's trip generation characteristics discussed in Chapter 2, the Project's own survey of community travel characteristics, data obtained from the University of California describing campus generated travel and information obtained from a variety of employers and community service agencies in Berkeley.

The resulting composite is well suited for the evaluation of transit improvements for Berkeley in the next 2-5 years. However, it should be recognized that travel patterns in Berkeley can change in ways that are difficult to predict as a result of shifts that

are occurring in national and regional policy, the economy and energy availability. The effects of transit improvements per se could significantly alter travel in Berkeley over the long term.

Service Performance

Transit serving Berkeley was inventoried to describe coverage, routes, schedules, hours of service, schedule adherence, operating procedures and equipment and other characteristics. From an operations standpoint, the analysis revealed a well run transit system.

The Project also took an extensive look from the user's view of how well Berkeley was served by transit. Transit trip times were calculated to representative destinations in the city from all its neighborhoods, including how long people take to walk, wait, ride and transfer. Community groups within Berkeley were identified that are not now served by transit, and service inconveniences were identified. The idea was not to criticize existing transit service, which is good, but to look for ways to make service better and more competitive with the automobile as a means of travel.

Potentials for Improvement

The Project relied on four fundamental local transit service concepts as a starting point for improving transit routing in Berkeley. Ideas for better buses, shelters and other service conveniences were included, along with ways to coordinate community development and the provision of social services with transit.

These concepts were further adapted to suit Berkeley's unique travel characteristics, and on the basis of the community comments, attitudes and concerns about transit that were received in the first phase of the Project.

TRAVEL CHARACTERISTICS

More than three-quarters of a million trips are made by people in Berkeley on an average weekday. The different categories of trips are shown in Figure 5 and Table 3. Note that local travel amounts to about 40 percent of all trips, while trips into and out of the city combined are only slightly more than local travel. The remaining travel, roughly 15 percent, are trips going through Berkeley non-stop. Travel between Berkeley and elsewhere in the Bay Area is shown in Figure 6.

Local Travel

Travel within Berkeley is comprised mostly of trips made by Berkeleyans, although there are a considerable number of mid-day trips made by people working in the downtown or attending U.C. Berkeley, and traveling in the vicinity to shop, eat lunch or browse.

The downtown, U.C. Berkeley and Telegraph Avenue are major destinations for local travel, although the city's other commercial districts and the Western Berkeley industrial area each also attract several thousand local trips each. Figure 7 shows the pattern of local travel, indicating that there is considerable travel from many areas to many destinations in Berkeley. In addition to the principal travel desires shown, numerous zones were found to have secondary trip linkages of less than 250 trips to the Solano area. External trips made on BART would also emphasize the importance of Zones 27, 40 and 51.

Several surveys, including those recently conducted the by Project and by the University of California amongst its students indicate many Berkeleyans walk or bicycle where they want to go. BUT THE MAJORITY OF LOCAL TRIPS ARE STILL BY AUTOMOBILE. LESS THAN ONE LOCAL TRIP IN TWENTY IS BY TRANSIT.

FIGURE 5
PROFILE OF TRAVEL IN BERKELEY
766,000 TOTAL WEEKDAY TRIPS

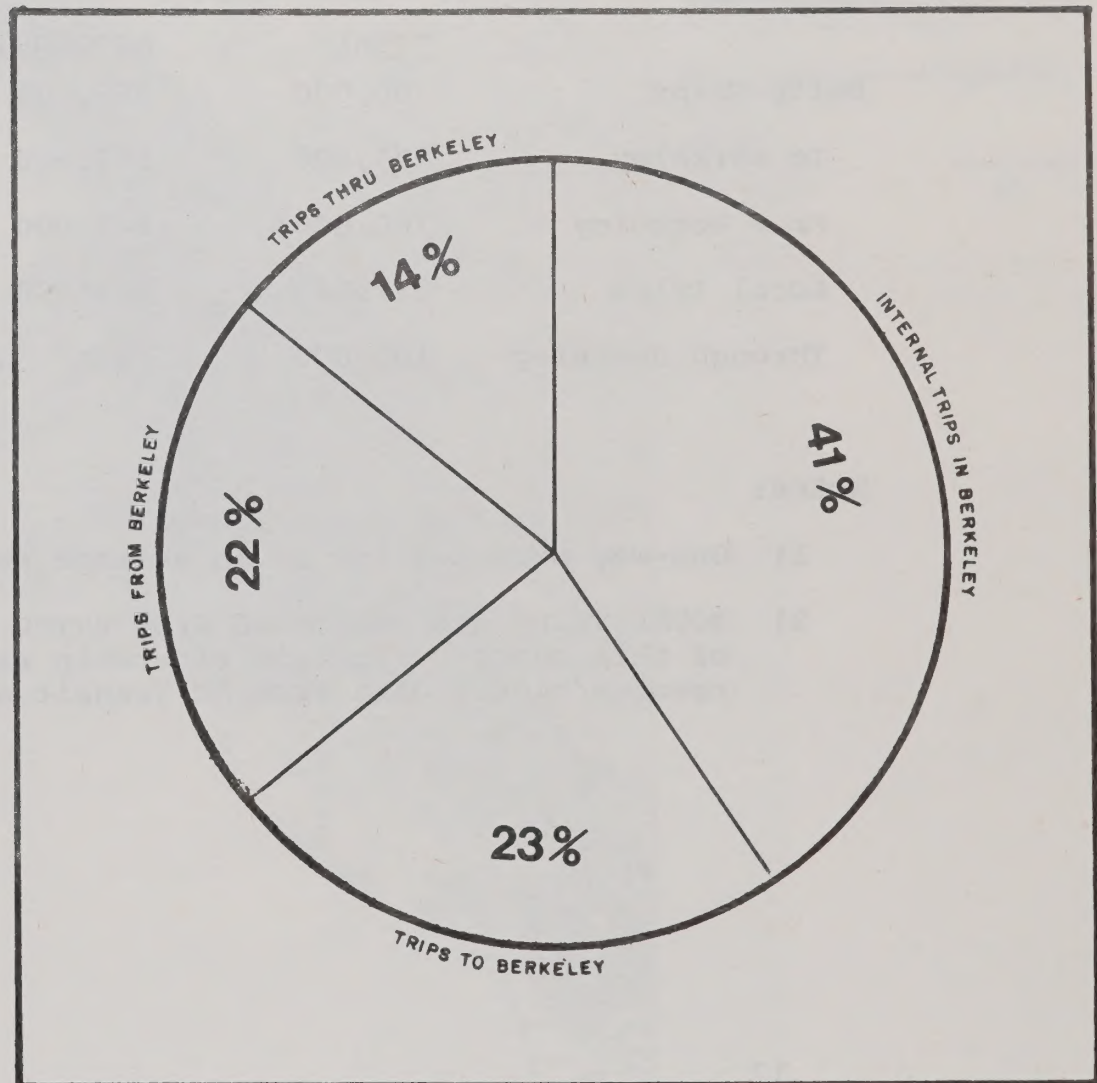


TABLE 3
SUMMARY OF BERKELEY TRAVEL PATTERNS¹⁾

	<u>TOTAL</u>	<u>AUTOMOBILE</u>	<u>TRANSIT</u>	<u>OTHER</u> ²⁾
Daily Trips	766,000	489,000	48,000	121,000
To Berkeley	175,000	162,000	13,000	-
From Berkeley	166,000	143,000	23,000	-
Local Trips	317,000	184,000	12,000	121,000
Through Berkeley	108,000	N/A	N/A	N/A

Notes:

- 1) One-way person-trips on an average week day in 1972-1973.
- 2) TOTAL TRIPS are estimated from RTTPP and adjusted as described in the text of this report. Transit ridership was estimated by reviewing BATS data, revenue/ticket data from AC Transit and BART.

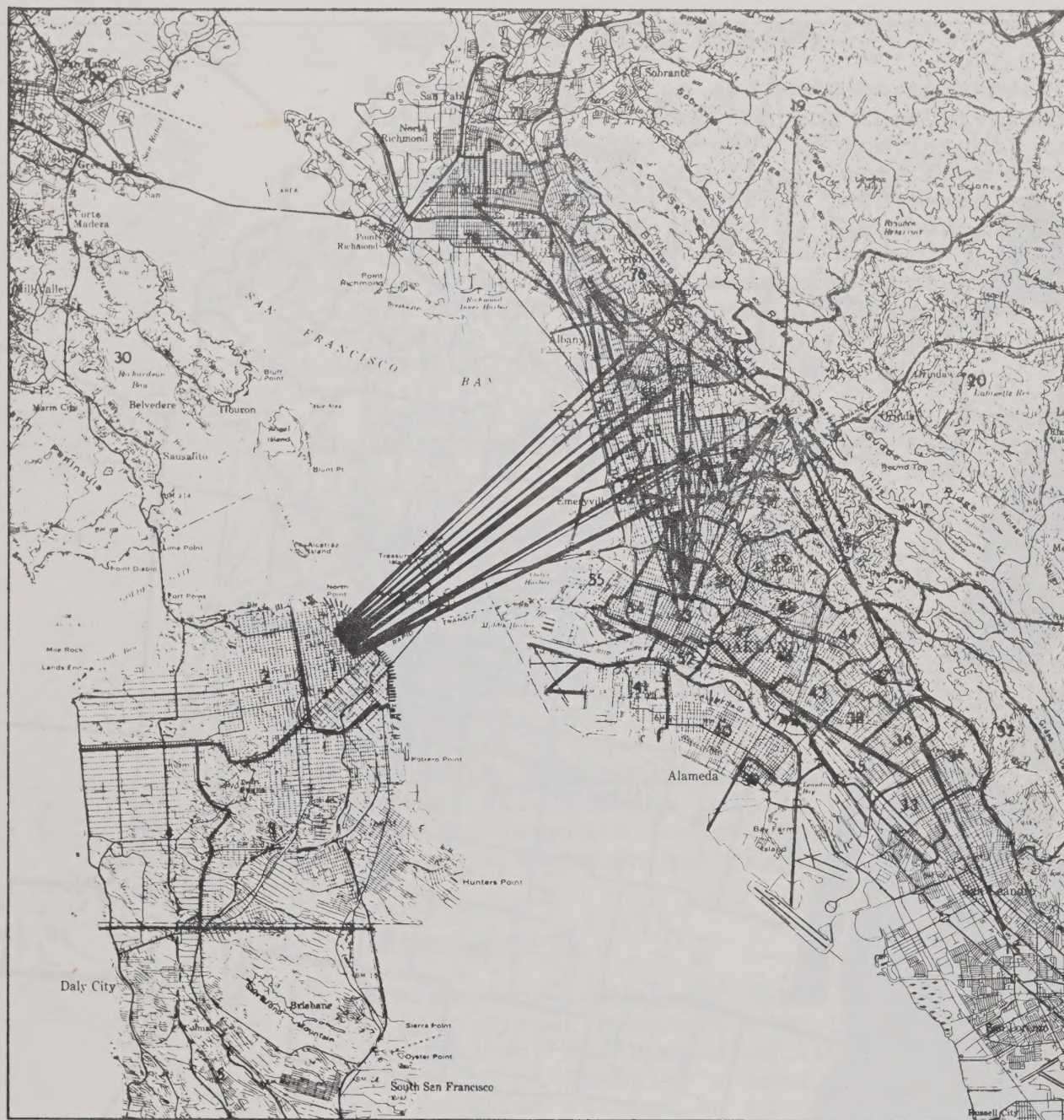


FIGURE 6
EXTERNAL TRAVEL DESIRES
CITY OF BERKELEY

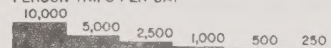
PERSON TRIPS PER DAY
 50,000 20,000 10,000 5,000
 TRIPS UNDER 5,000 NOT SHOWN

SOURCE - Regional Transit Travel Projection Project
 (1970 preliminary run)

LEGEND
 ZONE BOUNDARY
 ZONE NUMBER 60

FIGURE 7
INTERNAL
TRAVEL DESIRES
CITY OF BERKELEY

PERSON TRIPS PER DAY



TRIPS UNDER 250 NOT SHOWN

LEGEND

ZONE NUMBER

ZONE BOUNDARY

20



Travel Attracted to Berkeley

Nearly 200,000 trips are made on an average day by people coming into Berkeley to work, attend the University, shop or for other purposes. The University is the largest travel generator, attracting more than 100,000 trips, many from outside the city. The next largest attractors of trips into Berkeley are the West Berkeley industrial area followed by the downtown.

The major origins of this travel are the communities to the north and Oakland to the south, although there is some travel from central Contra Costa County, the Warren Freeway corridor in east Oakland, and San Francisco.

OVERALL, LESS THAN 10 PERCENT OF ALL TRAVEL COMING INTO BERKELEY IS BY TRANSIT, ALMOST ALL OF THE REMAINING TRIPS ARE BY AUTOMOBILE.

Travel Produced From Berkeley

Travel from Berkeley amounts to roughly 160,000 trips on an average weekday which is less than any other category except travel through the city. Oakland is the destination of nearly one-half the Berkeleyans traveling outside the city, and San Francisco attracts about 30,000 trips from Berkeley. Many Berkeleyans also travel to Richmond and other communities north of the city.

About 14 percent of all travel from Berkeley is by transit, essentially because this is the market on which current A.C. Transit and BART service focus. More than one-half of the Berkeleyans going to downtown San Francisco ride A.C. Transit or BART.

Latent Travel

The average Berkeleyan makes more than three trips per day but a significant proportion of Berkeleyans are less mobile than their neighbors. The approximately 12,000 disabled residents of Berkeley and many of Berkeley's aged travel less than once a day. Members of families without an automobile or with only one car, are also likely to make less than the average number of trips each day.

Conservatively, if these Berkeleyans were offered an attractive means of transportation and they were to make one more trip each day, they would increase total travel in Berkeley by roughly 15 percent.

EXISTING TRANSIT CHARACTERISTICS

Berkeley is provided transit by several operators. Their services include bus transport, rail rapid, school buses, special services, and taxi service. The city is also served by inter-regional transportation, as shown in Figure 8.

A.C. Transit, BART and the BUSD are the three principal operators of transit in Berkeley, although service is also provided by the University of California, taxis, the Center for Independent Living, the Red Cross, Herrick Hospital, the Senior Citizens Center and others. A detailed description of these services is contained in Appendix C.

A.C. Transit

A.C. Transit operates the most extensive public transportation service in Berkeley, and service to Berkeley is an integral part of A.C. Transit's total system. Of A.C. Transit's 16 transbay routes, four primarily serve Berkeley and another passes through the city. A.C. Transit has 40 local and 8 express East Bay routes. Only one of these 48 routes operates entirely within Berkeley and 17 operate in or through it. Nine percent of the total bus miles A.C. Transit operates daily are within Berkeley. These routes connect the city by public transportation to Oakland, downtown San Francisco and many other Bay Area destinations. Figure 9 shows the A.C. Transit routes serving Berkeley.

A.C. Transit's coverage, route structure, schedules, hours of service, fares, schedule adherence, load factors, speeds and rideability were assessed to determine both the quantity and quality of service provided in the Berkeley area. Overall, the quality of service provided and A.C. Transit's management efficiency were found to be very good.



**FIGURE 8
REGIONAL
TRANSPORTATION SERVING
BERKELEY**

FIGURE 9
EXISTING AC TRANSIT
ROUTES IN BERKELEY



Coverage - A.C. Transit operates 18 routes serving the Berkeley area including four transbay routes, two East Bay express routes and 12 local routes. Approximately 97 percent of Berkeley's residents are within one-quarter mile of an A.C. Transit route. A.C. Transit provides access to all five BART stations serving Berkeley, all major shopping centers, hospitals, schools and parks. Thus, A.C. Transit coverage of Berkeley is good.

Routes - A.C. Transit Company has numerous variations to their basic 18 Berkeley routes designed to serve specific needs during different times of the day. The routes provide three basic types of service; transbay, East Bay express, and East Bay locals. Transbay routes are designated by alphabetical letters while East Bay routes are assigned numbers.

Schedules - A.C. Transit generally does not operate on memory headways (consistent multiples of 5, 10, 15 or 20 minutes, etc.). Instead, vehicles are scheduled to maximize use of vehicles and according to special needs of routes. All four Berkeley Transbay lines operate at better than a 10-minute headway during the morning and evening peak commute hours. Only the 51/58 and 72 local lines operate this frequently. During the midday, most lines operate between 10 and 15-minute headways except the key east-west service in the southern portion of the city which operates at 30-minute and greater headways.

It should be noted that Berkeley's peak hour Transbay headways are distinctly directional favoring trips from Berkeley in lieu of trips to Berkeley. Also, headways are increased during the midday when a large proportion of Berkeley trips are made. The presence of U.C. Berkeley results in a disproportionately large number of midday trips compared to other Bay Area cities.

Hours of Service - The length of A.C. Transit's operation day varies by route. Roughly, service begins at 5:00 a.m. and continues to 1:00 a.m. Several routes operate only during peak hours or only during weekdays. Only the 43 route to Berkeley operates 24 hours a day.

Fares - A.C. Transit employs the exact fare plan which requires all patrons to have the exact fare. Drivers do not make change; however, they will accept up to a five dollar bill and issue a refund coupon to the rider.

The basic fare for local trips is 25 cents which is consistent with local fare levels of other major carriers in the Bay Area. A.C. Transit offers reduced fares to senior citizens, youths, high school students, the handicapped and children. Prior to July 1, 1974, A.C. Transit also offered a 20-ride book of tickets for transbay trips.

Load Factors - Load factors are ratios of the number of passengers riding a bus at a point in time to the seating capacity of the bus. Examination of load factor characteristics help identify which runs are overcrowded, necessitating larger capacity buses or more frequent service. Load factor data gathered by A.C. Transit during the first quarter of 1974 for selected routes during peak hours was reviewed to evaluate load characteristics of lines serving Berkeley.

Load factors in excess of 1.3 were recorded for both F and 51/58 routes and standees were also observed for routes 40, 43 and 72. Maximum loads on lines 40 and 43 were recorded near the closing times for schools and probably can be attributed to U.C. Berkeley and other student patronage.

Travel Speeds - Travel speeds are functions of traffic conditions and passenger on-off activity. With few exceptions, Berkeley routes operate slower than the average system speeds. Detailed analysis of two routes, the 51 and the 65 within Berkeley, indicated that from 15 to 33 percent of the operating time is spent with the doors open, loading and unloading passengers.

BART

Berkeley is served by five stations on the 34-station BART system; El Cerrito Plaza, North Berkeley, Center Street, Ashby and Rockridge. BART links Berkeley and the rest of the Bay Area with four lines that, when fully operational, will run on 71 miles of exclusive right-of-way. Figure 10 shows the BART travel times and fares between Berkeley and other points on the system.

FIGURE 10
BART FARE AND TRAVEL TIME MATRIX

(Example: Hayward to Powell St. costs \$1.20, and takes 30 minutes)

Fares

	Daly City		Balboa Park	Glen Park	24th St. Mission	16th St. Mission	Civic Center	Powell	Montgomery	Embarcadero	Oakland West	Concord	Pleasant Hill	Walnut Creek	Lafayette	Orinda	Rockridge	Richmond	El Cerrito Del Norte	El Cerrito Plaza	North Berkeley	Berkeley	Ashby	MacArthur	19th St. Oakland	Lake Merritt	Fruitvale	Coliseum	San Leandro	Bay Fair	Hayward	South Hayward	Union City	Fremont		
3	45	45	45	45	55	55	55	1.00	1.35	1.30	1.30	1.25	1.20	1.05	1.05	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
5	2	30	30	30	30	30	30	95	1.35	1.30	1.30	1.25	1.15	1.05	1.05	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
8	5	2	30	30	30	30	30	80	1.35	1.30	1.30	1.25	1.20	1.15	1.05	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
10	6	4	2	30	30	30	30	75	1.35	1.30	1.25	1.20	1.15	1.05	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
12	8	6	4	2	30	30	30	70	1.35	1.30	1.25	1.20	1.15	1.05	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
13	10	8	5	3	1	25	25	70	1.35	1.30	1.25	1.20	1.15	1.05	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
15	12	10	7	5	3	1	25	70	1.35	1.30	1.25	1.20	1.15	1.05	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
23	20	17	15	13	11	9	7	70	1.35	1.30	1.25	1.20	1.15	1.05	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
56	53	51	48	46	44	42	40	33	1.00	1.35	1.30	1.25	1.20	1.15	1.05	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
51	48	46	43	41	39	37	35	28	5	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30		
49	45	43	40	38	36	34	33	25	7	2	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
44	41	39	36	34	32	30	28	21	12	7	4	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
40	36	34	31	30	27	26	24	16	16	11	9	4	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
35	31	29	26	25	22	20	19	11	21	16	14	9	5	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
49	45	43	41	39	36	35	33	25	46	41	39	35	30	25	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
45	42	40	37	35	33	31	29	22	42	37	35	31	26	21	3	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
43	39	37	34	32	30	28	26	19	40	35	33	29	24	19	6	2	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
39	36	34	31	29	27	25	23	16	37	32	30	26	21	16	9	6	3	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
37	33	31	29	27	25	23	21	14	34	29	27	23	18	13	12	8	5	2	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
35	31	29	26	25	22	21	19	11	32	27	25	21	16	11	14	10	8	4	2	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
31	27	25	23	21	19	17	15	8	24	19	17	13	8	3	17	13	11	8	5	3	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
28	24	22	20	18	16	14	12	5	28	23	20	16	11	6	20	17	14	11	8	6	3	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
26	23	21	18	16	14	12	10	3	29	24	22	17	13	8	22	18	16	13	10	8	4	1	30	30	30	30	30	30	30	30	30	30	30	30	30	30
27	24	22	19	17	15	13	11	4	36	31	29	25	20	15	25	21	18	15	13	11	7	4	2	30	30	30	30	30	30	30	30	30	30	30	30	30
30	27	25	22	20	18	16	14	7	40	35	33	29	24	19	28	25	22	19	16	14	11	7	6	3	30	30	30	30	30	30	30	30	30	30	30	30
33	30	28	25	23	21	19	17	10	42	37	35	31	26	21	31	28	25	22	19	17	13	10	9	6	3	30	30	30	30	30	30	30	30	30	30	
37	34	31	29	27	25	23	21	14	46	41	39	35	30	25	35	31	29	25	23	21	17	14	12	10	6	3	30	30	30	30	30	30	30	30	30	
41	37	35	32	30	28	26	24	17	50	45	43	39	34	29	38	35	32	29	26	24	21	17	16	13	10	7	3	30	30	30	30	30	30	30	30	
44	41	38	36	34	32	30	28	21	53	48	46	42	37	32	42	38	36	33	30	28	24	21	19	17	13	11	7	3	30	30	30	30	30	30	30	
48	44	42	40	38	36	34	32	25	57	52	50	46	41	36	46	42	39	36	34	32	28	25	23	21	17	14	11	7	3	30	30	30	30	30	30	
52	49	47	44	42	40	38	36	29	61	56	54	50	45	41	50	47	44	41	38	36	32	29	28	25	22	19	15	12	8	4	30	30	30	30	30	
57	53	51	48	46	44	42	40	33	65	60	58	54	49	45	54	51	48	45	42	40	36	33	32	29	26	23	19	16	12	8	4	30	30	30	30	

Effective Nov. 3, 1975

Time

BA-208 9/75



Coverage - The three Berkeley BART stations are within one-quarter mile walking distance of only eight percent of Berkeley residents. Parking is provided at the North Berkeley and Ashby stations (700 and 560 stalls, respectively), and one of these stations is within ten minutes drive from any part of Berkeley. A.C. Transit bus routes serve all three Berkeley BART stations well.

Routes - BART ultimately intends to operate one East Bay and one transbay route through Berkeley. Currently, Berkeley is served by one East Bay route running from Richmond to Fremont with a transfer connection at MacArthur station to the Concord Line.

Schedules - BART ultimately is planned to operate on 2-6 minute headways during peak hours once their train control system is "debugged" and they have sufficient rolling stock. Currently, it operates on a basic 12-minute headway. With such frequent service, BART does not plan on publishing a detailed train schedule, but instead, intends to indicate train headways during different times of the day.

Hours of Service - BART currently operates from 6:00 a.m. to midnight, weekdays.

Unified School District

The Berkeley Unified School District provides school transportation to children in kindergarten through sixth grade. Warrants for school bus service are three-quarters of a mile coverage for kindergarten through third grade students, one mile for fourth grade through sixth grade students, and a mile-and-a-half for secondary school students. Berkeley buses carry approximately 5,200 students per school day to 23 schools. Ridership is comprised of about 3,500 kindergarten and primary school students, 425 early

childhood pre-schoolers, 140 special students, and 1,000-1,200 field trip students. Eleven kindergarten through third grade schools, four fourth through sixth grade schools, five pre-schools, two special kindergarten and one secondary school are served. The service to the secondary school is for special need students.

Children in the seventh through twelfth grades must either walk, bike, ride A.C. Transit or be driven by their parents. Some of the older students also drive to school. Students who ride A.C. Transit must pay 15 cents each ride either in cash (exact fare) or in tickets sold at secondary school offices in units of ten.

Taxi Cabs

Yellow Cab, Taxi Unlimited, Arrow and Rainbow Taxi companies provide service for Berkeley. These companies provide door-to-door service in Berkeley and to nearby East Bay destinations. Rates vary up to \$1.80 for the first mile and 90 cents per mile thereafter; thus, taxi have considerably higher fares than other public transportation serving Berkeley. Nonetheless, observations of taxi operators indicate that blacks, females, the elderly, heavy drinkers and the handicapped are frequent taxi users, in addition to the wealthy and visitors to Berkeley who can afford to pay taxi rates. Everybody uses a taxi at sometime or another, especially in emergencies.

Campus Buses

Two types of public transit service are offered by the University of California; shuttle services and inter-campus transportation. The shuttle services are the most heavily used and the most important to the Berkeley community. Four free shuttle services are provided at the University: a BART shuttle, Richmond Field Station shuttle, a Lawrence Berkeley Laboratory shuttle and a late night shuttle service to adjacent neighborhoods. The BART shuttle, operated by the University Student Association, ASUC, has an express route and a local route.

Transportation for the Disabled

The Center for Independent Living provides transportation for any disabled person within its target areas of Berkeley, Albany and North Oakland. The Senior Citizen's Center has a van to transport members to their Centers. The BUSD has small buses to transport handicapped and retarded children to special programs. In addition, transport for health patients and people requiring social services is provided by Herrick Hospital and the Red Cross.

Inter-regional Service

Three types of inter-regional public transportation serve Berkeley: railroad, buses and airplanes.

Railroad - Passenger rail service is provided by AMTRAK from their Oakland terminal at Sixteenth and Wood Streets. AMTRAK currently operates 28 train departures per week from Oakland serving Seattle, Los Angeles, Bakersfield and Chicago with transfer connections to other major cities. A.C. Transit provides service to the AMTRAK station via the #88 during the hours of scheduled AMTRAK service. However, the AMTRAK station is not within convenient walking distance of BART.

Buses - Two carriers, Greyhound West and Continental Trailways, serve Berkeley from their Oakland terminals. Direct service connections to the Greyhound terminal by A.C. Transit's 72 route, and to the Trailways terminal by A.C. Transit's 40/43 route is provided. These terminals are also within walking distance of BART's Oakland 19th Street station. Northbound Trailways buses also stop at 23rd Street in Richmond and Greyhound's Vallejo local stops at University and San Pablo and the Greyhound freight terminal about every three hours.

Airplanes - Both the Oakland and San Francisco International Airports serve Berkeley. Both airports can be reached by public transit, but the trip is very time-consuming and requires at least

two transfers (see Appendix B). To avoid a two transfer trip, air travellers can reach the San Francisco Airport by helicopter from Emeryville. The heliport, however, can not be reached directly by bus from Berkeley. Airport transit operates an hourly limousine service to Oakland Airport from the Durant Hotel on Telegraph Avenue.

POTENTIALS FOR IMPROVEMENTS

Although the existing service is good, the Project identified several ways that transit service in Berkeley could be improved. Essentially, transit improvement in Berkeley could occur on several fronts: re-emphasis of service, route restructuring, increased service, other service improvements, bicycle and pedestrian access to transit, parking and roadway policies, and coordinating community development. Today, transit is little used locally; thus, these improvements, in conjunction with Berkeley's program to discourage automobile traffic through neighborhoods, could potentially increase local ridership three-fold over the next five years with a full commitment from the community.

Re-emphasis of Service

A.C. Transit and BART are oriented mainly to carry people between Berkeley, Oakland and downtown San Francisco. Because of their service orientation, A.C. Transit and BART attract 30 percent of these trips. But trips to these destinations comprise less than one-fifth of Berkeley's total trips, and by orienting to serve this relatively small category of travel, A.C. Transit and BART attract less than 5 percent of Berkeley's overall travel. **THUS, RE-EMPHASIS OF TRANSIT TO ATTRACT A GREATER SHARE OF BERKELEY'S OVERALL TRAVEL IS A FUNDAMENTAL SERVICE IMPROVEMENT.**

With the inauguration of regular scheduled BART service on the Richmond-Daly City line and the resolution of bothersome operating problems, BART will provide a convenient transportation mode for most regional Berkeley trips. At this time, some of A.C. Transit's

transbay service will be redundant and will compete for the same revenue as BART. Thus, some A.C. Transit service can and should be reoriented to complement BART's regional role.

Local Travel - Local travel is the largest category of travel in Berkeley. It is comprised of trips from many places to many other places within the city, although many local trips are to the University of California, the downtown, the West Berkeley industrial area and the other major trip attractors described in the last chapter. Presently, walking is faster than riding transit for many local trips (see Table 4). Local transit service is particularly poor from the Berkeley hills to most destinations, from neighborhoods west of Sacramento Street to the downtown and U.C. Berkeley, except along University Avenue, and from most parts of Berkeley to the Marina and West Berkeley industrial area. Transit provides service substantially faster than walking only along the north-south routes that also connect Berkeley with Oakland and San Francisco. Thus, THE BASIC IMPROVEMENT TO LOCAL SERVICE SHOULD BE A SYSTEMATIC REORGANIZATION OF ROUTES WITHIN BERKELEY TO CONNECT MANY MORE PLACES IN THE CITY TO EACH OTHER. By providing better connections between Berkeley destinations and BART and A.C. Transit East Bay routes, better local service will also improve regional service and ridership.

Travel to Berkeley - On an average day, there are more people travelling to Berkeley than Berkeleyans travelling elsewhere. The two greatest attractors of travel into Berkeley, the University and West Berkeley industrial area, are not well served by transit. Potential for improving service to the University is discussed in Chapter 4. TRANSIT SERVICE TO THE INDUSTRIAL AREA AND OTHER MAJOR ATTRACTORS CAN BE SIGNIFICANTLY IMPROVED BY SYSTEMATICALLY REORGANIZING ROUTES TO MAKE BETTER CONNECTIONS BETWEEN THESE ATTRACTORS, BART STATIONS AND A.C. TRANSIT ROUTES. These improvements would complement the good regional service that is provided from the north and south, and from the Concord corridor in eastern Contra Costa County. The other significant origin of Berkeley destined

Table 4
LOCAL TRAVEL COMPARISON - EXISTING TRANSIT^{1/}
(Total Trip Time, Door-to-Door, in Minutes)
Berkeley Coordinated Transit Project

HOME NEIGHBORHOOD	MODE	DESTINATION							
		Down- town	U.C. Campus (Mining Circle)	Telegraph Ave. @ Haste	Nearest BART	Shattuck @ Cedar	Solano @ Colusa	University @ San Pablo	Elm- wood
Industrial Area (Zone 11)	Transit	25-43	33-55	28-61	14-47	22-36	18-71	12-25	38-71
	Auto	18	25	27	11	13	14	10	24
	Walk	48	76	84	28	40	32	22	64
San Pablo Area (Zone 15)	Transit	18-56	24-68	27-63	10-46	20-60	15-36	8-24	15-36
	Auto	19	25	23	10	16	19	11	19
	Walk	52	76	68	24	48	60	30	44
Westbrae/ University Gardens (Zone 20)	Transit	15-49	23-60	20-54	6-40	19-57	30-64	5-19	30-64
	Auto	16	23	27	9	10	14	8	21
	Walk	36	68	76	16	28	36	9	52
Flatlands Area (Zone 29)	Transit	10-44	20-56	17-51	8-22	16-57	19-52	11-36	17-65
	Auto	14	22	19	9	12	14	9	17
	Walk	24	30	28	18	36	36	20	36
SUDS Area (Zone 22)	Transit	14-33	18-56	22-54	11-23	14-53	19-51	16-18	19-51
	Auto	17	23	23	11	14	16	8	18
	Walk	44	68	36	30	40	44	14	40
Thousand Oaks (Zone 33)	Transit	16-42	24-63	23-89	15-65	20-65	7-41	21-71	22-35
	Auto	17	24	24	12	11	7	13	23
	Walk	44	72	72	36	32	8	36	60
Hillside Area (Zone 45)	Transit	7-14	14-27	15-51	7-14	In Zone	9-15	15-38	18-31
	Auto	13	19	20	10		10	12	18
	Walk	18	22	28	26		24	40	40
Hills Area (Zone 47)	Transit	33-69	34-70	39-104	33-69	37-82	48-84	42-92	51-94
	Auto	16	20	22	13	9	13	16	18
	Walk	40	26	64	36	20	32	40	40
South Campus (Zone 52)	Transit	6-12	14-24	5-36	6-15	9-17	15-34	15-35	9-44
	Auto	12	20	17	11	12	10	12	14
	Walk	10	24	12	32	22	36	36	26
Le Conte (Zone 71)	Transit	9-26	14-35	10-56	5-37	13-69	20-46	19-15	7-39
	Auto	14	22	18	7	11	16	14	12
	Walk	24	32	2	8	36	60	32	14
Claremont (Zone 58)	Transit	21-87	29-99	16-96	15-88	20-56	31-109	30-111	8-74
	Auto	19	22	21	11	17	19	19	13
	Walk	52	64	36	30	52	72	72	20
S. Berkeley Model Cities (Zone 31)	Transit	13-23	17-35	14-59	5-16	14-24	24-49	16-41	12-52
	Auto	15	23	21	7	13	16	13	15
	Walk	36	68	60	8	31	64	28	28

^{1/} Times include walk to bus stop, wait, riding time, transfer time and walk to destination.

travel is the Warren Freeway corridor in eastern Oakland. This corridor is virtually unserved by public transportation and should be provided frequent transit service, both to Berkeley and to the Rockridge BART station enroute.

BART-A.C. Transit Coordination - Coordination of transit services is presently a main regional transportation policy concern. Berkeley has a stake in the outcome: From the City's point of view, the inauguration of BART service to Oakland and San Francisco provides the opportunity for A.C. Transit to concentrate on providing better transit locally, and in corridors not served by BART.

Route Restructuring

There are three fundamental types of routing strategies. Two are established and successful methods to make many different places accessible by transit. The third, the classic radial, is designed to maximize trips that can be made without a transfer. These are shown in Figure 11.

- Grid Routing - is a method that would make it possible for a person to get from any place to any other place in Berkeley directly or by one transfer. Buses must be frequent on every route, so that transferring is easy. Metropolitan Toronto's transit system operates on the "grid" method. It has the highest per capita transit ridership of any North American metropolitan area, carrying 18-25 percent of all trips.
- Timed Transfer - is a method that brings routes together at strategic points, so that several buses can meet at the same time and exchange passengers. These strategic meeting points are located at activity centers, so that people can reach a large number of destinations, either directly or with transfers that involve stepping off one bus and immediately on to another. Golden Gate Transit and areas in suburban Sacramento

FIGURE 11
TRANSIT SERVICE CONCEPTS

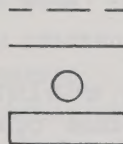
LEGEND

Metra Area Boundary

Transit Route

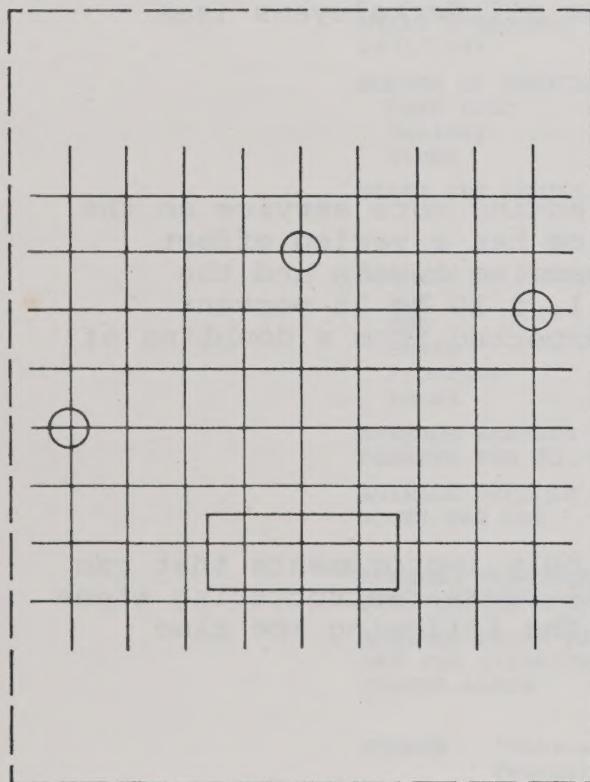
Major Activity (University or Shopping Center)

Downtown



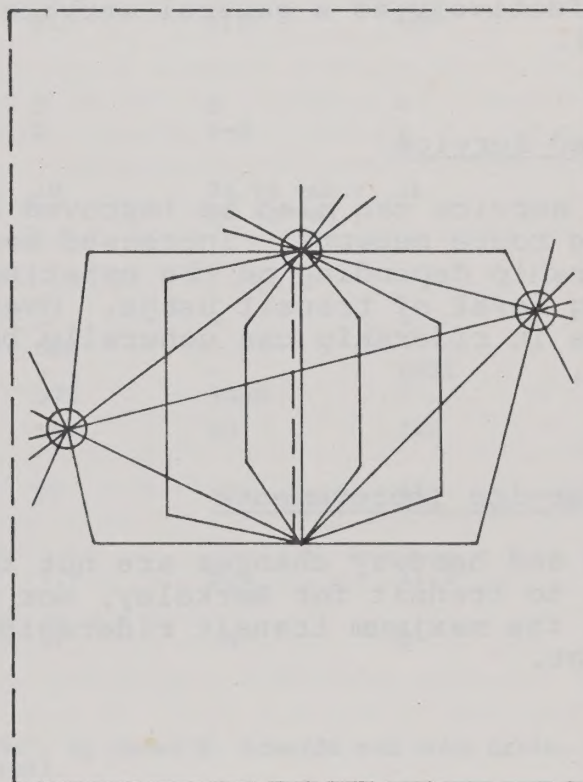
GRID

Frequent service on all routes to make transferring easy.



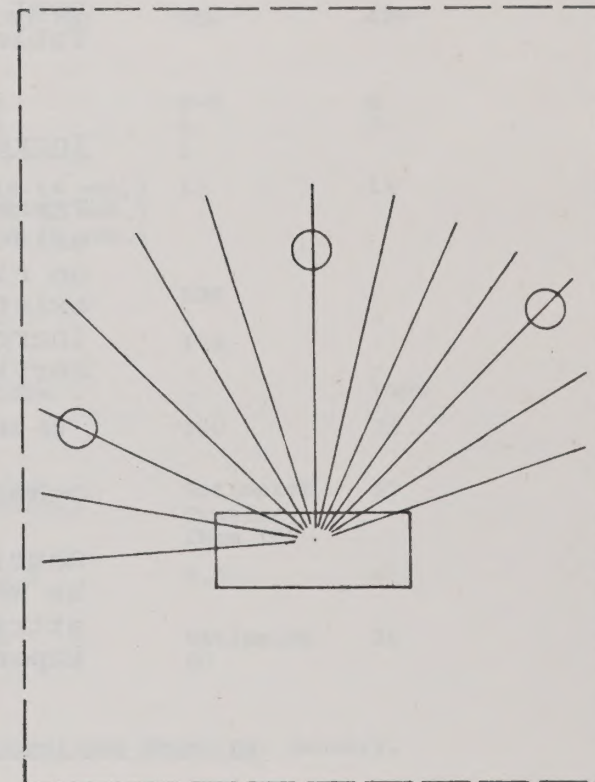
TIMED TRANSFER

Buses on all routes arrive at same time at main meet points to make transferring easy



CLASSIC RADIAL

Buses operate to downtown as fast as possible



use this method. Edmonton, Canada, increased ridership 25 percent with timed transfers after experiencing declining patronage for several years without it.

- Classic Radial - is the routing method that is used now by A.C. Transit. This method provides good north-south service in much of Berkeley, and direct service to downtown Oakland.

In addition, the Project was asked to evaluate the concept of "dial-a-ride" service, a hybrid taxi-bus operation that responds to the demands of riders with routing that is the shortest path to pick up several riders at their door steps and drop them at various destinations. Although the dial-a-ride concept is popular, and has several apparently attractive features, the Project confirmed that dial-a-ride does not have the capability to operate cost effectively as a general service for all Berkeleyans (see Table 5).

Increased Service

Transit service can also be improved by adding more service on the existing route network. Increased service has a varied effect on ridership depending on the existing service levels and the existing level of transit usage. Overall, a 10 to 25 percent increase in ridership can generally be expected from a doubling of service.

Other Service Improvements

Routing and headway changes are not the only improvements that can be made to transit for Berkeley, nor will route restructuring alone attract the maximum transit ridership. The following are also important.

Table 5

DEMAND ACTIVATED SERVICE CHARACTERISTICS
Berkeley Coordinated Transit Project

	<u>ANN ARBOR MICHIGAN</u>	<u>BATAVIA NEW YORK</u>	<u>BAY RIDGES ONTARIO</u>	<u>COLUMBIA MARYLAND</u>	<u>HADDONFIELD NEW JERSEY</u>	<u>LA HABRA CALIFORNIA</u>
NAME OF DEMAND RESPONSIVE SYSTEM	Dial-a- Ride	B-Line	Go-Transit	Call-a- Ride	Dial-a-Ride	Dial-a-Ride
DATE SERVICE STARTED	9/71	10/71	6/70	1/71	5/72	2/73
POPULATION SERVED	10,000	18,000	14,000	17,300	25,000	40,000
1970 CITY POPULATION	99,800	18,000	2,280,000 (Metro. Area)	17,300	33,000 est.	40,000
AREA SERVED (sq. mi)	1.36	5.5	1.9	6	5+	6
SERVICE HOURS	6:30 a.m.- 6:00 p.m.	6:00 a.m.- 6:00 p.m. M-F	5:00 a.m.- 1:00 p.m. (intermittent)	8:30 a.m.- 11:00 p.m.	Continuous	7:00 a.m.- 7:00 p.m.
AVERAGE FARE	50¢	50¢	25¢	50¢	50¢	50¢
DAILY PATRONAGE 1971/1972	210	410	460	250-300	550	420
NUMBER OF VEHICLES						
Peak Hour	3	5	4	8	6-8	6
Holiday	2	2-5	4	8	5	0
Other					1	
SEATS PER VEHICLE	10	23 (4 veh.) 10 (1 veh.)	11	19 (4 veh.) 10 (2 veh.) 8 (2 veh.)	17	17
SOURCES OF FUNDING						
DOT	-	-	-	-	83%	-
HUD	-	-	-	-	-	-
State	63%	-	-	-	17%	-
Province	-	-	100%	-	-	-
Local	37%	100%	-	100%	-	100%
AVERAGE SERVICE DEMANDS PER SQ. MI.	157	80	242	42-50	110	70
AVERAGE VEHICLE HOURS PER DAY	28	45	41	116	Estimated Greater Than 100	65
AVERAGE PASSENGERS PER VEHICLE HOUR	7.7	9.1	11.3	2.5	5.5	6.5
AVERAGE HOURS PER DAY FOR DISPATCH CENTER LABOR	12	24	2-	6	Estimated 60	26

SOURCE: "Dial-a-Ride", by James W. Schmidt and John Crain, Metropolitan Magazine, January, February, 1973.

Service for the Disabled - No matter how well a transit system is laid out, it cannot be used by a person unless he or she has the ability to access it. Because it appears infeasible to load and unload wheelchairs from regularly scheduled buses, because of the long dwell times required, a special service for the disabled is needed. This service, and how it should be coordinated with community service programs operated by the City are described in Chapter 6. There is a substantial latent need for this service, and providing disabled Berkeleyans with the same mobility as their neighbors could result in increased transit ridership of several thousand trips per day.

Better Buses - The buses operated by A.C. Transit (see Appendix C) are clean and reliable. However, they are not suited for operation on many of Berkeley's streets, because they cannot climb the steeper Berkeley hills quietly and do not fit into neighborhoods. Also, they are not suited for routes with heavy patronage and many stops, due to the narrow front door and even narrower side door that must be opened by the alighting passenger. These characteristics limit where buses can operate, and reduce both the efficiency and comfort of service.

Fares - Improving fare policy can produce increased transit usage in Berkeley. However, this does not mean simply reducing fares. In fact, experience in other cities suggests that transit ridership would not be increased significantly by fare reductions below the basic 25¢ per ride charged by A.C. Transit. Rather, fare policy should minimize the perceived cost of riding transit. It should be coordinated with Berkeley's parking policies, so that the automobile does not receive unfair subsidy. Also, new fare collection methods are needed that do not restrict the design of transit vehicles and the efficiency of their operation by requiring the driver to watch every passenger single-file past the fare-box. The fare policy described in detail in Chapter 6 includes passes, merchant rebates and fare marketing.

Comfort and Safety - Many Berkeleyans say they do not ride transit because waiting for the bus or walking to their destination from the bus stop is uncomfortable and unsafe. Concern about safety is prevalent among women and the aged, who are more likely to be victims of bus-stop crime. Interest in "dial-a-ride" transit seems mainly related to the safety of door-to-door service. During the day and early evening hours, transit service that is both frequent and predictable can significantly improve the comfort and safety of waiting. The well-lighted shelters proposed in Chapter 6 are also an improvement. However, in the late evening when safety is particularly a problem, a limited dial-a-ride service could be operated. Cooperation from the police department should also be requested to concentrate late night security to public transportation corridors.

Bicycle and Pedestrian Access

Virtually all public transportation users walk to or from the service. It is, therefore, of paramount importance to assure adequate pedestrian access to public transportation services. Access should be as direct and flat as possible and have adequate lighting and drainage. The improvement of bicycle access can also increase accessibility.

Parking and Roadway Policies

Substantial increases in transit ridership, and correspondingly decreased traffic in Berkeley, will only happen if the recommendations of the Neighborhood Traffic Study and improvements to transit are acted upon together. This is because transit ridership in Berkeley will be determined both by the quality of transit service (the objective of this Project) and policies to control people from using their automobile (the objective of the Neighborhood Traffic Study).

The availability of convenient and inexpensive parking has also been shown to have a significant effect on transit usage. The impact of parking on transit usage is particularly important

for local trips, as parking represents a proportionately greater amount of time for short trips than for long trips. Berkeley has recently raised its parking rates and the University of California at Berkeley is aggressively re-examining its current parking policies.

RIDERSHIP POTENTIAL

The ridership potential of transit improvements was evaluated by the Project (see Appendix D); however, it may be necessary to conduct more detailed patronage analyses of the adopted program of transit improvement to make a final assessment of fare revenues.

Approach

Berkeley was divided into Transit Analysis Zones as described earlier in this Chapter. The Neighborhood Traffic Study trip table was reaggregated to these Transit Analysis Zones and adjusted according to the information about employment and visitation of activities collected by the Project. Then the LEVEL OF SERVICE of existing transit and each of four alternative proposals described in Chapter 5 were identified by determining the total trip time by transit, including walking, waiting, riding, transfer and walking time from the various neighborhoods of Berkeley to key destinations. These travel times were compared with walking and driving times for comparable trips assuming automobile travel was controlled by neighborhood traffic improvements. Finally, the N-dimensional Logit Model was used for representative trips to estimate how many people would take transit or drive their automobile.

General Findings

As might be expected, significant improvements to local transit service significantly increased transit ridership potential. With better transit service for trips coming into Berkeley, there appears to be a substantial potential for increasing transit's share of these trips as well.

4 university of california

This Chapter deals briefly with the transportation needs and impacts of the University of California at Berkeley that are related to transit improvements for the City.

U.C. Berkeley has a day-time population of about 50,000 students, faculty, staff and visitors. It generates over 100,000 trips on an average day, about the number of trips generated by the City of El Cerrito or the City of Antioch. Today, transit service to the University is inadequate and many students and employees reach the Campus by automobile. Thus, better transit connections along with policies to discourage parking on Campus could have a significant effect on the City of Berkeley's overall transportation situation.

ACTIVITY CHARACTERISTICS

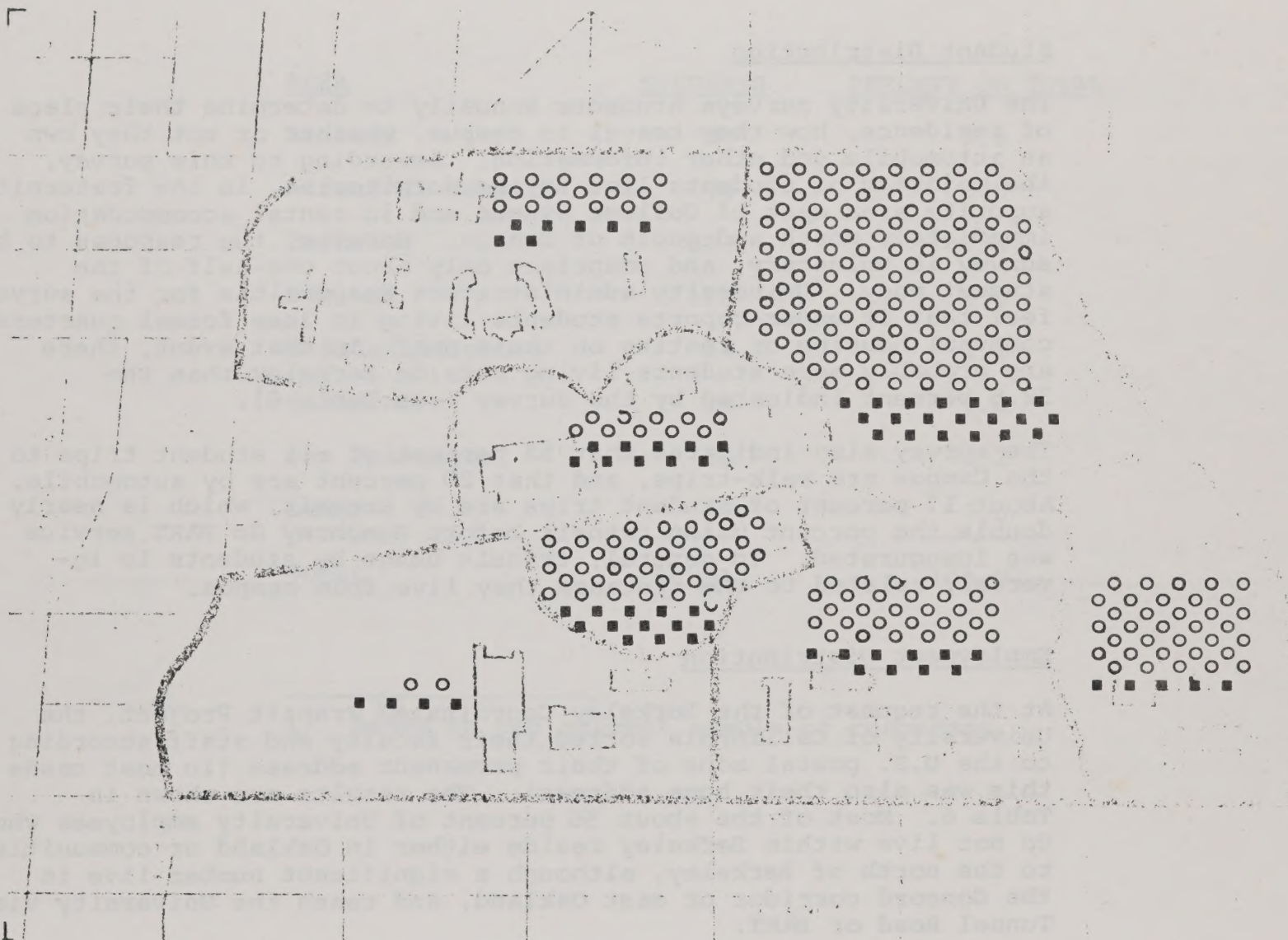
The U.C. Berkeley Campus has an enrollment of about 28,000 students and employs about 10,000 faculty and staff, although some students have part-time jobs on Campus. The University also attracts several thousand visitors, deliveries and business trips on an average day. Overall, it is estimated that the University has a day-time population of about 50,000 people.

Activity on Campus is greatest during the Fall, Winter and Spring quarters, and continues at a high level throughout the day and evening. About 30-40 percent of the total Campus student and employed population is found in the northeast part of the University, where the sciences and engineering cluster around the Mining Circle, although there are other large concentrations of activity in the center of Campus and in the Lawrence Radiation Laboratory area (see Figure 12). Contrary to popular belief, the Sather Gate area which is the perceived center of Campus actually has little classroom or administrative activity. However, a large number of people go through the area on their way to or from Telegraph Avenue and the area is the center of significant social activity.

FIGURE 12
DISTRIBUTION OF STUDENTS, FACULTY AND STAFF

LEGEND

- = 100 STUDENTS BY MAJOR FIELD OF STUDY
 ■ = 100 FULLTIME EMPLOYED FACULTY AND STAFF



TRAVEL CHARACTERISTICS

The origins of regional and local trips to U.C. Berkeley are shown in Chapter 3, Figures 6 and 7 respectively. While there is some information about student, faculty and staff travel to Campus, little is known about other University generated trips.

Student Distribution

The University surveys students annually to determine their place of residence, how they travel to campus, whether or not they own an automobile and other information. According to this survey, the majority of students live in the dormitories, in the fraternity-sorority area east of College Avenue and in rental accommodation immediately north and south of Campus. However, the response to the survey is voluntary, and comprises only about one-half of the student body. University administrators responsible for the survey feel that it under-reports students living in less formal quarters, communal housing or renting on their own. In that event, there are probably more students living outside Berkeley than the 32.6 percent indicated by the survey (see Table 6).

The survey also indicates that 53 percent of all student trips to the Campus are walk-trips, and that 20 percent are by automobile. About 17 percent of student trips are by transit, which is nearly double the percent using transit before Humphrey Go BART service was inaugurated. In general, transit usage by students is inversely related to the distance they live from campus.

Employment Distribution

At the request of the Berkeley Coordinated Transit Project, the University of California sorted their faculty and staff according to the U.S. postal zone of their permanent address (in most cases this was also their home address). The results are shown in Table 6. Most of the about 56 percent of University employees who do not live within Berkeley reside either in Oakland or communities to the north of Berkeley, although a significant number live in the Concord corridor or east Oakland, and reach the University via Tunnel Road or BART.

Table 6
 DISTRIBUTION OF U.C. BERKELEY
 STUDENT RESIDENCES
 Winter Quarter 1972 1/
 Berkeley Coordinated Transit Project

<u>AREA</u>	<u>STUDENTS</u>	<u>PERCENT OF TOTAL</u>
Alameda	47	3.5
Albany/El Cerrito	74	5.5
Berkeley	897	67.4
Oakland	128	9.6
Orinda/Lafayette	14	1.1
Richmond	18	1.4
San Francisco	56	4.2
Other	97	7.3
TOTAL	1,331	100.0

1/ Based on ten percent sample of responses.

Table 7
FACULTY AND STAFF RESIDENTIAL DISTRIBUTION
Zip Code Sort
Berkeley Coordinated Transit Project

<u>RESIDENTIAL LOCATION</u>	<u>FACULTY</u>		<u>STAFF</u>		<u>TOTAL</u>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Berkeley	2,153	57.8	2,489	37.0	4,742	44.4
Oakland	281	7.5	1,430	21.2	1,711	16.4
Alameda County Other	33	0.9	210	3.1	243	2.3
San Francisco	208	5.6	160	2.4	368	3.5
West Contra Costa County	195	5.2	1,045	15.5	1,240	11.9
Concord BART Corridor	327	8.8	501	7.4	828	7.9
Contra Costa County Other	25	0.7	126	1.9	151	1.4
Marin/Napa Counties	67	1.8	46	0.7	113	1.1
San Mateo/Santa Clara Counties	74	2.0	65	1.0	139	1.3
Other	365	9.7	662	9.8	1,027	9.8
TOTAL	3,728	100.0	6,734	100.0	10,462	100.0

TRANSIT SERVICE

Presently, the University is inadequately served by transit. The south and southwest sides of Campus are bordered by frequent bus service, but it is the north side of Campus where most Campus activity is located. This side of Campus is essentially served only every half-hour by A.C. Transit's #7 Euclid route.

Although A.C. Transit buses are denied surface entry into the University, the popularity of the Humphrey-Go-BART shuttle demonstrates the potential of direct service. Unfortunately, Humphrey does not have the capacity to carry large numbers of riders, and enters Campus only from the south. If BART were better connected to the University, both from the Center Street and Rockridge stations, it would provide better regional service from the north, south and the Concord corridor.

The location of the University also makes it difficult to provide transit service to neighborhoods to the north and south. Since buses are not allowed to operate through the Campus, they must be routed around it, either to the west or east. This adds approximately 50 route miles over what would be needed if buses could drive through Campus, and makes it nearly impossible to ride transit, for example, from the Hillside area to Telegraph Avenue, or from South Campus to the Euclid shopping district.

Looking ahead toward longer-range improvement of transit service to the University, the Berkeley Coordinated Transit Project Coordinator prepared a report entitled "Selective Transit Physical Improvements for Berkeley". The report concludes that, "The best solution to the University transit problem is a routing of regular transit services through the center of the Campus ... this treatment would bring the entire Campus within walking distance of transit routes serving the Campus area from the hills, the south and west. Furthermore, it would conveniently connect with BART stations, remote parking lots and other transit routes serving the rest of Berkeley and much of Oakland, Albany and El Cerrito."

The report notes that operating standard buses through the University on the surface would be disruptive, and goes on to examine several ideas for transit subways through the University. Although a transit subway through the University would be expensive, its benefits should be studied since the University actually generates more trips than many activity centers in the Bay Area that are currently provided grade-separated BART service. Such a study should assess the benefits also of electric buses (trolley coach and battery) being routed through campus.

POTENTIAL FOR IMPROVEMENT

There are several major transit improvements that could be made to serve the University of California better. These have three basic objectives:

1. Provide a high capacity direct connection into U.C. Berkeley from the Warren Freeway corridor via Rockridge BART station.
2. Provide a direct connection into the Campus from west Berkeley via the BART Center Street station.
3. Establish transit service between north and south Berkeley through the University.

5 alternatives

Three alternative concepts were developed during the early phases of the study for application in Berkeley. These were refined during the course of the study into four service proposals which included:

- Proposal 1A - Dial-a-Ride
- Proposal 1B - Grid Service
- Proposal 2 - Timed Transfers
- Proposal 3 - Modified A.C. Transit Service

This chapter describes the evaluation of these proposals which led up to the selection of the grid proposal by the Berkeley Transit Study Coordination Board and the technical and citizen advisory committees. Table 8 shows the individual route headways which were used to evaluate the four alternative proposals.

PROPOSAL 1A & 1B GRID

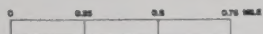
Proposal 1A is shown in Figure 13. It consists of nine fixed routes and a four-zone dial-a-ride system. Conceptually, the fixed routes are intended to serve the high volume north-south corridors and dial-a-ride is intended to serve the lower volume east-west movement and door-to-door travel demands.

Routes 4, 8 and 9 provide east-west service at about 1.5 mile intervals in Berkeley. Route 8, which connects with all the north-south lines and serves downtown and U.C. Berkeley is envisioned as a high capacity line. Streetcars or articulated buses would probably be employed to provide the needed capacity. Similarly Route 1 which serves the high volume College Avenue corridor would probably require high capacity vehicles.

Table 8
HEADWAYS OF FOUR SERVICE PROPOSALS
Berkeley Coordinated Transit Project

PROPOSAL 1A			PROPOSAL 1B			PROPOSAL 2			PROPOSAL 3		
Route	Base	Peak	Route	Base	Peak	Route	Base	Peak	Route	Base	Peak
1	5	5	1		5	1	15	15	7	15	10
2	5	2.5	2	10	10	2	15	15	17	15	15
3	15	10	3	10	10	3	15	15	37	15	15
4	15	10	4	15	15	4	15	15	40	15	10
5	15	15	5	10	10	5	15	15	43	15	15
6	15	10	6	10	10	6	15	15	51	10	5
7	15	10	7	10	10	7	15	15	65A	15	10
8	15	10	8	10	5	8	7.5	7.5	65B	15	10
9	15	15	9	10	10	9	15	15	67	15	15
			10	10	10	10	15	15	72	15	10
			11	10	10	11	15	15	88	20	10
			12	10	10	12	7.5	7.5	100	-	30
			13	10	10	13	15	15	111	15	15
			14	10	10	14	15	15	112	10	5
						15	15	15	113	30	30
									114	30	15
									115	15	15
									116	15	15
									E	15	15
									F	15	15
									G	30	15

1



Four service zones were developed for the dial-a-ride portion of the service. Each zone would have 10 to 15 vehicles responding to requests. The zones have easily identifiable boundaries which are located on major activity corridors. Thus, these activity corridors are generally available from at least two service zones. Each service zone has access to downtown, U.C. Berkeley, a BART station and an outlying grocery/shopping area. All four zones provide service within walking distance to Berkeley High School. Zone 4 provides door-to-door service between Herrick and Alta Bates Medical Centers.

During the development of Proposal 1A, it became apparent that reliance on dial-a-bus for east-west service might be less efficient than east-west fixed route shuttles. Proposal 1B was developed as shown in Figure 14 to evaluate this aspect. The dial-a-ride service was replaced by six east-west shuttles (Routes 10-15) which, in general, provide service every one-half mile apart.

PROPOSAL 2 - TIMED TRANSFER

This proposal is an application of the timed transfer method. Basically, all-day headways on most routes would be 15 minutes, and in some cases every $7\frac{1}{2}$ minutes. Existing A.C. Transit routes would be reoriented, as shown in Figure 15, so that there would be continuous north-south routes on major streets from one end of Berkeley to the other: on 6th Street; San Pablo (as at present); Sacramento/Santa Fe; Grove/the Alameda/Colusa; Shattuck/the Arlington; and Telegraph/Euclid. (The College Avenue route would continue to be diverted down University Avenue, as at present.) In addition, east-west service would be improved. Service on Ashby would be more frequent. Service on Dwight west of Shattuck would be discontinued, but would be replaced by new frequent services on Derby and Bancroft which would reduce the maximum walking distance to east/west bus routes. (The Derby service would be put in with one or more traffic diverters having a movable arm, so as not to encourage through automobile traffic.) New service would go in on Cedar.

FIGURE 14

proposal 1B
 MAJOR NORTH-SOUTH TRANSIT
 ROUTES OPERATED IN
 CONJUNCTION WITH
 EAST-WEST SHUTTLES

LOCAL BUS ROUTE ———
 SPECIAL TREATMENT
 TRANSIT ROUTES
 BUS LINE NUMBER 7
 END OF LINE (8)
 EAST-WEST SHUTTLES

0 0.25 0.5 0.75 MILE

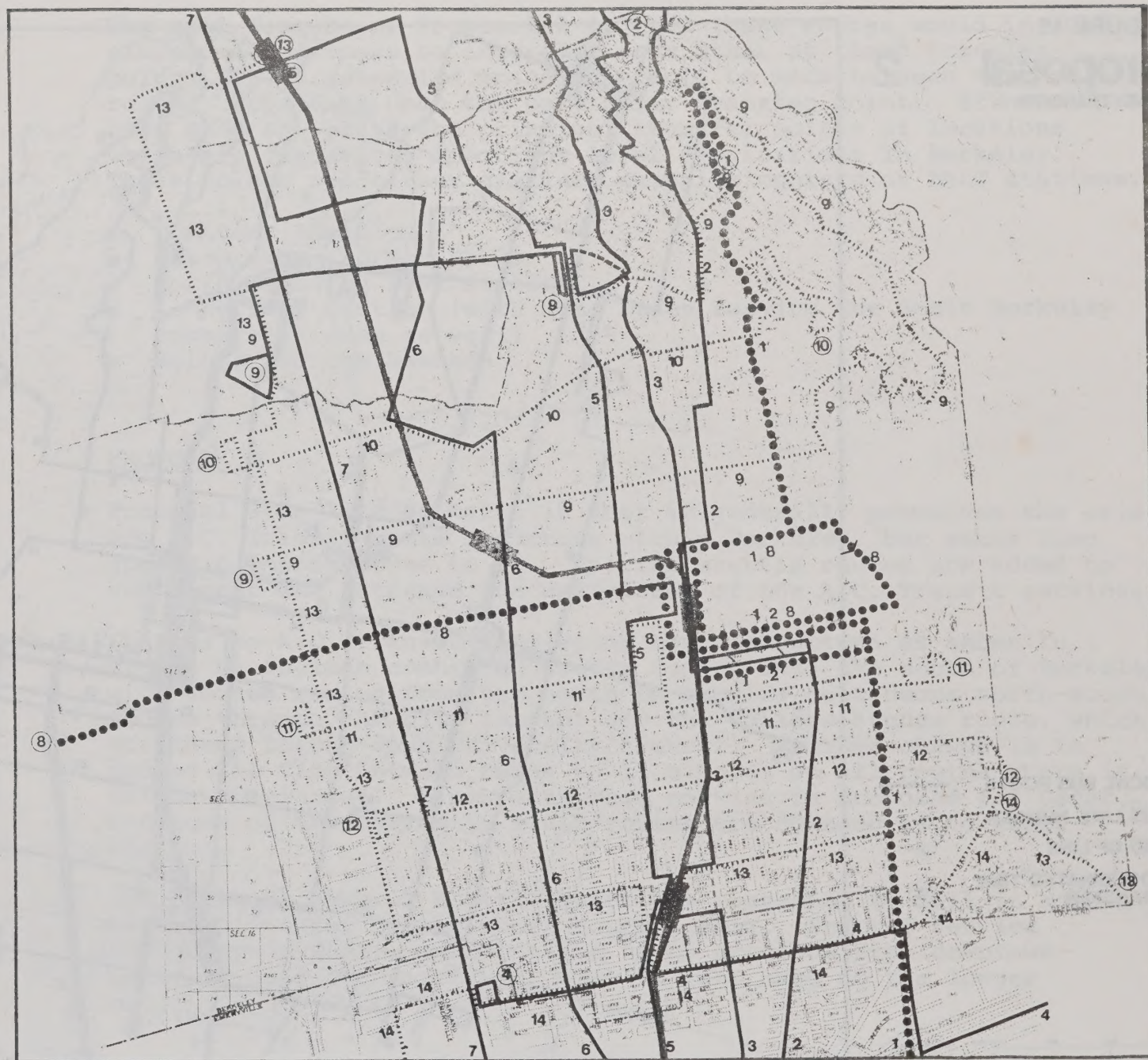


FIGURE 15

proposal
TIME TRANSFER

2

LOCAL BUS ROUTE

BUS LINE NUMBER

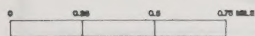
END OF LINE

COORDINATED TIME
TRANSFER

7

8

10



The main feature of Proposal 2 is that these routes would in some places make detours to intersect each other at timed transfer points, where scheduled transfers could be made between most or all routes, depending upon the particular transfer point. Efforts have been made to locate the principal transfer points at locations which are themselves important local destinations in Berkeley. These points are either distinct shopping centers or BART stations:

- Downtown Berkeley
- University and San Pablo
- North Berkeley BART Station
- Ashby BART Station (with most buses serving the South Berkeley commercial area as well)
- Solono and the Alameda

PROPOSAL 3

Proposal 3 is less dramatic in that it generally preserves the existing A.C. Transit route structure within Berkeley, but makes some specific improvements to it. Special shuttle routes are added to complement and increase the usefulness of the A.C. Transit services.

Changes to A.C. Transit's existing route structure as shown in Figure 16 include combining routes coming into the south of Berkeley with routes coming from the north to provide continuous north-south routes through the city (except for the College Avenue route, which continues to run down University Avenue). Another change is to reduce the time between buses to 15 minutes on all routes where it is now 30 minutes. A new east-west service is proposed for Cedar, and some of the currently minor routes are changed as to where they go.

In addition, several shuttle buses are suggested to fill in some gaps not covered by the above route system. Shuttle service (Humphrey-Go-BART) must continue to be provided from downtown Berkeley into the campus in order to make many of the longer

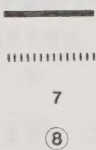
FIGURE 16

proposal

MODIFIED AC SERVICE WITH
COMPLEMENTARY SHUTTLES

3

LOCAL BUS ROUTE
SHUTTLE SERVICE
BUS LINE NUMBER
END OF LINE



0 0.35 0.7 0.75 MILES



distance bus routes serve as campus access. An elephant train ^{1/} shuttle allowing free boarding and alighting is proposed for Shattuck Avenue, so that people who take the bus or BART downtown have a convenient means to go from one store to another which is at some distance. A shuttle loop from the hills is proposed so that many hill residents can get to both North Berkeley shopping areas. In addition, special bus service is proposed from north of Richmond to the West Berkeley industrial area, and University Village continues to be linked to the University by a shuttle, which continues to the Radiation Laboratory.

EVALUATION

The proposals were compared with each other and with the existing A.C. Transit service, according to a set of evaluation criteria that included: RIDERSHIP CHARACTERISTICS, PATRONAGE, COSTS AND REVENUES, COMMUNITY-ENVIRONMENTAL IMPACTS AND FEASIBILITY. The purpose of the evaluation was to provide a basis for selecting one proposal to be developed into a more detailed action program. The existing transit service was included in the evaluation as a bench-mark and to help participants in the project decide whether transit improvements are needed at all.

- Ridership Characteristics - assessed what it would be like to ride transit with each proposal. How long would the walk take from home to the bus stop, and how soon would the bus come by? How much time would the trip take; would transfers be involved? Would there be a walk after getting off the bus? What would be the quality of the ride?
- Patronage - was estimated for each proposal, according to the travel demand it served and the level of service it provided.

^{1/} The term "elephant train" is used to describe a multi-unit vehicle generally consisting of a tractor and several trailer cars. They are currently illegal for transporting passengers in California.

- Costs and Revenues - were generally estimated to establish how much subsidy would be needed to operate each proposal. Cost of operating and maintaining service was estimated by the estimating method used by A.C. Transit. Revenue estimates assumed a 25¢ fare.
- Community-Environmental Impacts - were assessed in terms of each proposal's effect on traffic and in making accessible community services, jobs, leisure activity and other opportunities.
- Feasibility - was generally assessed by identifying the operational and institutional implications of implementing each proposal.

There are several aspects common to all proposals. These were evaluated only in comparison with existing service.

FINDINGS

Substantially better transit for Berkeley will cost roughly \$10 million to \$12.5 million per year in 1975 dollars, or about \$2.0 to \$4.5 million more than the cost of today's service. Since Berkeley routes also serve other East Bay communities, these communities would also get better transit service. Better service could increase transit's share of travel to and within Berkeley from less than 8 percent to 10 to 15 percent in the next five years. Improved transit service coming into Berkeley, particularly in the Warren Freeway-College and Telegraph Avenue Corridor and along University Avenue, could increase transit's share of trips by visitors even more.

The results of the evaluation of the three proposals and existing transit service are summarized below. The key findings are:

Ridership Characteristics

The Timed Transfer (2) and GRID (1B) Proposals have superior ridership characteristics. All four proposals substantially improve transit service within Berkeley, with the notable exception of the Dial-a-Ride variation of Proposal 1 (1A). Table 9 depicts a portion of the 20 by 19 zone work chart used for the evaluation.

- The Dial-a-Ride Proposal (1A) does not have the capacity to carry even today's local transit riders. Breakdowns of dispatching, meandering routing to pick-up and drop-off many passengers and the necessity of transferring for trips into another dispatching cell (see Figure 13) would create a generally lower level of service than today's transit system.
- With ideal circumstances, A.C. Transit service gets people around Berkeley nearly as fast as would proposals 1B, 2 and 3, except from the Berkeley Hills and portions of West Berkeley. But ideal circumstances are that the rider knows the schedule, the bus is on time, and the connecting bus on transfer trips happens to be there at the right time. With adverse circumstances -- just missing a bus and a transfer connection - walking is faster for many local trips.
- Proposal 3 improves upon A.C. Transit service with shorter travel times for most local trips even under adverse circumstances. Most trips in Berkeley by Proposal 3 take no longer than 45 minutes, whereas some local trips by A.C. Transit today could take more than one and a half hours. Although it provides, on the average 20-30 minute service from the Hills to the downtown, Campus and South Berkeley, Proposal 3 travel times are longer than A.C. Transit's from several locations in Berkeley to Campus, North Berkeley BART and particularly the West Berkeley industrial area.

Table 9
TRAVEL TIME COMPARISON MATRIX
SAMPLE CELLS
Berkeley Coordinated Transit Project

RANDOM ANALYSIS ZONES	SERVICE	TO KING JUNIOR HIGH					TO DOWNTOWN					TO U. C. BERKELEY MINING CIRCLE					TO WEST BERKELEY 7th & CARLETON				
		Wait	Ride	Transfer	Walk	Total	Wait	Ride	Transfer	Walk	Total	Wait	Ride	Transfer	Walk	Total	Wait	Ride	Transfer	Walk	Total
11	1B	1-10	19	-	-	10-19	1-10	17	1-5	-	19-32	1-10	20	1-5	-	22-41	1-10	7	-	-	8-17
	2	1-8	14	1-3	-	16-25	1-15	14	1-3	-	16-32	1-15	22	1-3	-	24-40	1-15	6	-	-	7-21
	3	1-30	12	2-20	-	15-62	1-30	16	2-10	-	19-56	1-30	20	2-25	3	26-78	1-30	10	-	-	11-40
	Existing	1-10	11	-	5	17-26	1-15	17	-	-	18-32	1-15	24	1-5	-	26-44	1-10	7	-	7	15-25
15	1B	1-10	19	1-10	-	21-39	1-10	14	1-10	-	16-34	1-10	18	1-5	-	20-33	1-10	3	-	-	4-13
	2	1-15	15	1-3	-	17-33	1-15	15	1-3	-	17-33	1-15	19	1-3	-	21-37	1-15	2	-	-	3-17
	3	1-10	13	1-10	-	15-33	1-10	12	1-15	-	14-37	1-10	22	1-10	-	24-42	1-10	2	-	-	3-12
	Existing	1-10	16	1-15	5	23-66	1-30	12	1-5	-	14-47	1-30	19	2-10	-	22-59	1-10	2	-	7	10-19
20	1B	1-10	7	1-10	-	9-27	1-10	11	1-10	-	13-31	1-10	10	1-5	-	15-28	1-10	7	1-10	-	9-27
	2	1-15	7	1-3	-	9-25	1-5	16	1-3	-	18-24	1-15	19	-	-	20-34	1-8	8	-	-	9-16
	3	1-10	8	1-10	-	10-28	1-10	12	1-5	-	14-27	1-10	16	1-15	-	12-41	1-10	9	1-30	-	11-49
	Existing	1-30	7	1-15	-	9-52	1-30	12	-	-	13-42	1-30	19	1-5	-	21-54	1-10	7	-	5	13-22
31	1B	1-10	16	-	3	20-29	1-10	10	-	-	11-20	1-10	21	1-5	-	23-36	1-10	8	1-10	-	10-28
	2	1-15	15	1-3	-	17-33	1-15	9	1-3	-	11-27	1-15	15	1-3	-	17-33	1-15	11	1-3	-	14-29
	3	1-10	15	-	-	16-25	1-15	9	-	-	10-24	1-15	12	1-15	-	14-42	1-15	8	1-30	-	10-53
	Existing	1-15	14	1-15	-	16-44	1-10	9	-	-	10-19	1-10	16	1-5	-	15-31	1-10	7	1-30	7	16-54
45	1B	1-10	4	1-10	-	6-24	1-10	4	-	-	5-14	1-10	8	1-5	-	10-23	1-10	17	1-10	-	19-37
	2	1-15	11	1-3	-	13-29	1-15	4	-	-	5-19	1-15	1-	1-3	3	15-31	1-15	20	2-6	-	23-41
	3	1-15	7	1-10	-	9-32	1-15	4	-	-	5-19	1-15	7	1-15	3	11-40	1-15	18	2-35	-	21-68
	Existing	1-8	11	-	3	15-44	1-8	4	-	-	5-12	1-8	12	1-5	-	12-25	1-8	14	1-25	7	24-51
52	1B	1-10	11	1-10	-	13-31	1-10	3	-	-	41-13	1-10	9	-	-	10-19	1-10	9	-	-	10-19
	2	1-15	11	-	-	12-26	1-15	3	-	-	4-18	1-15	10	-	3	14-28	1-15	14	1-3	-	16-32
	3	1-15	11	1-10	-	13-36	1-8	3	-	-	4-11	1-8	7	1-10	3	12-28	1-15	11	1-10	-	13-36
	Existing	1-10	8	-	5	14-23	1-5	3	-	-	4-8	1-5	10	1-5	-	12-20	1-8	14	2-25	7	24-53
58	1B	1-10	22	1-10	-	24-42	1-10	14	1-5	-	16-29	1-10	24	2-10	3	30-47	1-10	20	-	-	21-30
	2	1-15	11	1-3	-	13-29	1-15	16	1-3	-	18-34	1-15	14	2-6	-	17-35	1-15	20	-	-	21-35
	3	1-15	8	1-10	-	10-33	1-15	15	1-5	-	17-35	1-15	13	-	-	14-28	1-15	17	1-40	-	19-72
	Existing	1-60	10	1-15	-	11-85	1-60	18	-	-	19-78	1-60	25	1-5	-	27-90	1-60	19	1-30	7	28-116

- Proposals 1B and 2 have the best travel time characteristics. By minimizing transfer times, the most time consuming part of local transit trips. Proposal 2 gets the experienced transit rider (who knows when the first bus will go by) to local destinations in slightly lower time (5-15 minutes) than it takes by car. On the other hand, Proposal 1B operates buses more frequently on routes with better coverage, thus providing the casual rider with generally better service. Alternative 1B, however, inconveniences riders by increasing transfers and Alternative 2 inconveniences riders at each timed transfer point.
- The special service for the disabled provides ridership to a sizeable group of Berkeleyans that otherwise cannot get around at all. In fact, many of the disabled are now so immobile they do not know where they need and want to travel. There is a possibility that this special service could be expanded to serve the aged and others who find it difficult to use regular transit, particularly in the evenings.

Shelters, better vehicle design and improved bicycle access provide all the proposals with better quality travel, although these improvements will have far less effect on patronage than faster transit travel and shorter waiting times.

Patronage

Improved service in Berkeley could result in roughly a two-fold increase in local transit travel over the next five years, to about 25,000 trips per average weekday. Although travel into Berkeley by bus will not increase dramatically, travel by BART will, PROVIDED LOCAL TRANSIT SERVICE FROM BART TO BERKELEY DESTINATIONS IS GOOD.

- The corridors with the greatest patronage potential are the West Berkeley industrial area and the College-Telegraph Avenue corridor to downtown and campus, particularly if the latter corridor is improved from the Warren Freeway Corridor to Rockridge BART station. However, there is also considerable

travel demand from the North Berkeley Hills to El Cerrito, the U.C. Campus, downtown and south of campus. Much of the remaining travel within Berkeley is between many origins and destinations.

- The Dial-a-Ride Proposal has the least patronage potential. The generally low level of service it provides would discourage riders and likely reduce transit's share of local travel to less than 2 percent, including patronage on A.C. Transit's north-south routes -- about 10-15 thousand trips on an average weekday instead of about 40,000 today.
- Proposal 3 would likely attract more patronage than existing service, but provides less service to the largest potential generators and more service to outlying areas.
- Proposals 1B and 2 have the largest patronage potential. This is because both serve dispersed local travel well and improve feeder service from BART riders to important local destinations.

None of the proposals provide excellent service to the major activity concentration on U.C. Campus, which is around Mining Circle. Even more dramatic increases in patronage would occur if service were routed into Campus to serve this area directly, with a corresponding policy to discourage parking.

Cost-Revenue

The costs shown in Table 10 are for improving the entire system of routes serving Berkeley, including those portions of the routes outside the city, but north of downtown Oakland.

The operating cost of the proposals is roughly the same, about three million 1975 dollars per year more than the cost of existing service. The capital cost is 3.3 to 4.8 million dollars, depending on whether new bus yard and maintenance facilities are needed, plus the cost of modifications to the Warren-Grove Shafter Freeway interchange.

Table 10
COST ANALYSIS OF ALTERNATIVE SERVICE PROPOSALS^{1/}
Berkeley Coordinated Transit Project

ELEMENT	ITEM	CAPITAL COST		OPERATING/MAINTENANCE ^{4/}	
GENERAL	. Shelters & New Bus Stop Signs	\$	800,000		
	. Dispatch Center <u>1/</u>		500,000		
	. Operating Center <u>2/</u>		1,500,000		included below
	. Park-Ride Lot @ Highway 17 <u>3/</u>		2,000,000		
PROPOSALS			<u>Number</u>	<u>Cost</u>	
1A	Standard Buses <u>5/</u>	98	**	Total	\$11,165,000
	Local Buses	50	\$1,100,000		
	Special Buses	<u>10</u>	<u>270,000</u>	Increase	2,940,000
	TOTAL	158	\$1,370,000	(over exist.)	
1B <u>6/</u>	Standard Buses <u>5/</u>	79	**	Total	\$12,645,000
	Local Buses	50	\$1,100,000		
	Special Buses	<u>10</u>	<u>270,000</u>	Increase	4,420,000
	TOTAL	139	\$1,370,000		
2	Standard Buses <u>5/</u>	125	**	Total	\$10,954,000
	Local Buses	-	-		
	Special Buses	<u>10</u>	\$ 270,000	Increase	2,729,000
	TOTAL	135	\$ 270,000		
3	Standard Buses <u>5/</u>	121	**	Total	\$10,394,000
	Local Buses	17	\$ 374,000		
	Special Buses	<u>10</u>	<u>270,000</u>	Increase	2,169,000
	TOTAL	148	\$ 644,000		
EXISTING TRANSIT SERVICE (A.C. TRANSIT AND HUMPHREY GO-BART)					\$ 8,225,000

^{1/} Center for transit information and dispatching special service/dial-a-ride.

^{2/} Additional yard and maintenance facilities or expansion of A.C. Transit or BUSD yards.

^{3/} Land, construction and access off Highway 17.

^{4/} Includes operating, maintenance and administration @ 27 percent overhead.

^{5/} It has been assumed that standard buses could be reassigned from transbay service when BART begins full operation.

^{6/} Selected for refinement.

^{7/} 1975 dollars.

Revenues from increased patronage would pay a share of added operating costs, but not all. At present fare levels, an additional annual subsidy of 2-3 million dollars would be required to operate any of the proposals, except the Dial-a-Ride Proposal. The subsidy for Dial-a-Ride would be considerably more, because it would generate lower fare revenue than today's service.

Community-Environmental Impacts

Increasing transit patronage to and within Berkeley to 2, 3 times today's levels appears possible, and would reduce traffic on the City's arterial streets so that diversion of neighborhood traffic can occur and leave total arterial traffic volumes about the same as today's, at least for the next five years.

- The Grid and Timed-Transfer proposals have sufficient patronage potential to help maintain arterial street traffic at today's level.
- Beefing up A.C. Transit service would have somewhat lower patronage potential, but still have a considerable impact upon traffic levels.
- Dial-a-Ride would actually increase traffic on Berkeley's streets because of its inability to carry large numbers of trips efficiently.
- Proposed transit improvements in the Warren Freeway corridor, in conjunction with changing the Tunnel Road interchange to get buses to/from the Warren and Grove Shafter Freeways and to disconnect Tunnel Road, could significantly reduce traffic on Tunnel Road, Ashby Avenue east of Telegraph and College Avenue.
- The small buses proposed for local routes, particularly with the Grid proposal, would be slightly noisier than neighborhood traffic now.

The proposals would provide better access to community services, jobs, shopping, leisure activity and other opportunities.

- The Grid and Timed-Transfer proposals provide the best overall access to opportunities in Berkeley.
- Beefing up A.C. Transit provides good access to most opportunities, but does not serve the Mining Circle area of the U.C. Campus, the Berkeley Marina and the industrial area as well as Proposals 1B or 2.
- The Dial-a-Ride provides new opportunities to people who are unable to use fixed route transit service, but does so by lowering overall access to a variety of activities, and at the service expense of people able to use fixed route service.

Feasibility

With the exception of the Dial-a-Ride proposal, all the proposals for improved transit for Berkeley seem to be effective. But the proposals vary considerably with regard to operating and institutional feasibility.

- Operation - the Grid proposal is the "cleanest" operationally. East-west routes in the grid can operate independently from north-south A.C. Transit routes, which would change from existing service mainly by running more often. The Timed-Transfer proposal would require A.C. Transit to operate modified and more complicated scheduling on a major part of the East Bay system. Proposal 2 would restrict scheduling flexibility of individual routes. Beefed up A.C. Transit service in Berkeley would effect the East Bay system somewhat, but could be implemented by the District using their current operating procedures.
- Institutional - the Grid proposal presents clear institutional options. With north-south routes owned and operated by A.C. Transit, the local east-west routes forming the grid could be owned by the City or A.C. Transit and operated by the City, A.C. Transit, the Berkeley Unified School District or privately. However, labor problems and management coordination would definitely arise with two different operators providing bus service in Berkeley. The proposals would probably be owned and operated by A.C. Transit as part of the District's overall

system, but the City would presumably be asked to pay its share of service improvements. Berkeley would also want assurance that its contribution was applied to service for Berkeley. The financial and management arrangements for local contribution to and control of a portion of the larger A.C. Transit system are likely to be complex.

Summary

It was generally agreed that the Grid and Timed Transfer service proposals would provide the greatest travel time improvements in Berkeley. Of the two proposals, the Grid service concept involved fewer institutional problems and was considerably simpler to operate. Additionally, its component route capacities could easily be increased, whereas the capacity of the Timed Transfer routes were constrained by the transfer point capacities and by the headways of routes which they were mated to.

Increased service on a modified A.C. Transit route network, while probably the easiest to implement, did not provide sufficiently improved travel times needed to increase patronage significantly.

While providing dial-a-ride service to people in Berkeley who are unable to use regular transit was considered desirable, the proposal to rely on Dial-a-Ride for community-wide transit did not provide adequate capacity or competitive travel times for improving transit in Berkeley.

The Grid service plan was, therefore, formally selected for refinement into an efficient plan. Refinements were needed to improve access to BART, to improve operating efficiency, to facilitate vehicle compatibility with topographic and load conditions and to conform with the city's major thoroughfare plan.

6 action program

This Chapter recommends an action program for improving transit in Berkeley. It is based on the Grid service proposal that was adopted by the Berkeley Coordinated Transit Development Project Board on November 26, 1974.

OVERVIEW

The recommended action program includes the following main elements: a SERVICE PLAN, a CAPITAL AND CONSTRUCTION PLAN, a MANAGEMENT PLAN, and a FINANCIAL AND IMPLEMENTATION PLAN. In addition, a description of the benefits which are anticipated from the implementation of the recommended plan and the steps required to implement the plan is included in this chapter.

Beginning the program will involve a lot of effort, particularly next year. Several transit operators, the City of Berkeley and the University of California must work together to make it happen. The benefits, however, of improved transit for Berkeley could be substantial:

- The program could provide transit service that for most trips gets people where they want to go in Berkeley in just a few minutes more than it takes to drive.
- Substantially improved transit could increase local transit ridership 2-3 times (Figure 17) from its present low level, to the point that it will carry up to 8-12 percent of all local trips.
- Improved local distribution from regional transit service could increase ridership into and out of Berkeley (Table 11). Increased service frequencies on routes serving Oakland could also increase overall East Bay transit usage.
- Many Berkeleyans who cannot use transit today will be provided an inexpensive means of travel which does not impose on their

Table 11
FIVE YEAR PATRONAGE FORECASTS

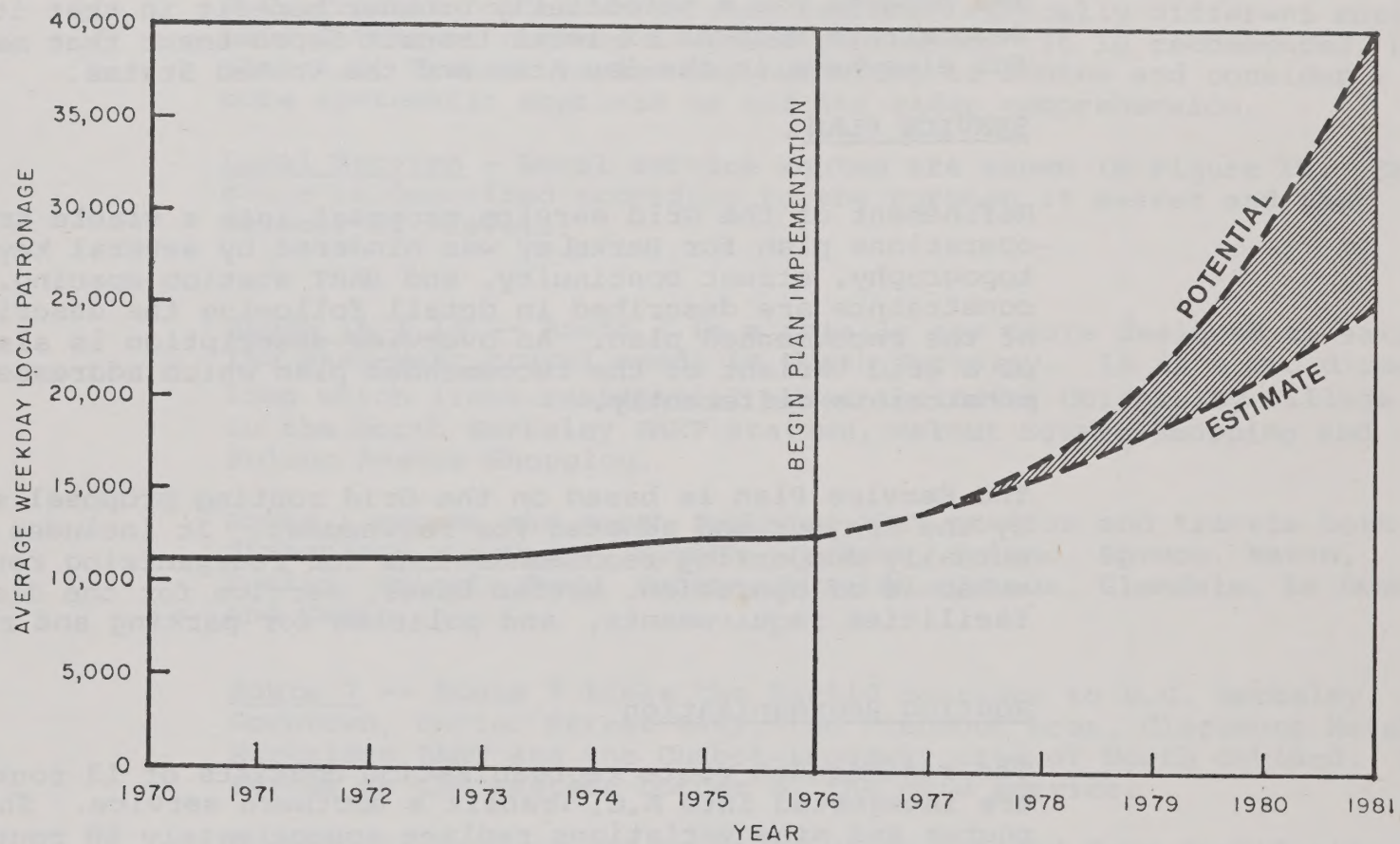
	<u>1973</u>	<u>1981 ESTIMATE</u>	<u>1981 POTENTIAL^{3/}</u>
<u>A.C. Transit</u>			
Local Berkeley	12,000	25,000	40,000
To or From Berkeley	13,000	19,000	24,000
Other East Bay ^{1/}	20,000	26,000	29,000
Transbay	<u>11,000</u>	<u>4,000</u>	<u>4,000</u>
Sub-Total	56,000	74,000	97,000
 BART	 <u>12,000</u>	 <u>25,000^{2/}</u>	 <u>25,000^{2/}</u>
 TOTAL	 68,000	 99,000	 122,000

1/ Trips made on Berkeley lines north of downtown Oakland with neither an origin or a destination in Berkeley.

2/ Patronage increases partially the result of diversion from A.C. Transit transbay service.

3/ Achievable under optimal conditions.

FIGURE 17
LOCAL TRANSIT PATRONAGE PROJECTION



friends and family.

- The combined effect of neighborhood traffic controls, better local transit and improved transit into Berkeley could help maintain traffic on the city's arterial streets at about current levels if supported by appropriate parking controls.

The program has a potentially broader benefit in that it could demonstrate methods of local transit improvement that may be useful elsewhere in the Bay Area and the United States.

SERVICE PLAN

Refinement of the Grid service proposal into a viable transit operations plan for Berkeley was hindered by several key constraints, topography, street continuity, and BART station spacing. These constraints are described in detail following the description of the recommended plan. An overview description is also presented of a grid variant of the recommended plan which addresses the key constraints differently.

The Service Plan is based on the Grid routing proposal evaluated by the Project and adopted for refinement. It includes several mutually supporting recommendations for reorganizing routes, schedule of operation, better buses, service for the disabled, facilities requirements, and policies for parking and roadways.

Routing Reorganization

The recommended route reorganization consists of 13 routes which are integrated into A.C. Transit's northern service. The 13 recommended routes and nine variations replace approximately 68 route variations with which A.C. Transit currently serves Berkeley. The relative simplicity of the proposed service plan by itself should attract more patronage, particularly by the elderly and children. The simplicity of the grid routing concept improves its effectiveness at attracting non-repetitive shopping and social trips which comprise

a large share of the local travel market.

Essentially, the reorganized routes will make it possible for people to get from anywhere in Berkeley to anywhere in Berkeley and to regional transit connections with no more than one transfer with an average waiting time of five minutes.

The recommended routes are given the numbers of roughly the existing A.C. Transit routes which they replace; radically different routes have different numbers to avoid confusion. It is recommended, however, that A.C. Transit review its numbering of routes and consider a more systematic approach to aid its rider comprehension.

Local Service - Local service routes are shown in Figure 18. Each route is described according to the purpose it serves and the streets it travels.

Route 1A & 1B -- Route 1 is a totally new route designed to satisfy the east-west travel needs in North Berkeley. It is a two direction loop which links residential areas including University Village, to the North Berkeley BART station, Walnut Square Shopping and Solano Avenue Shopping.

Route 1 serves the North Berkeley BART station and travels both directions via Cedar, Eighth, Jackson, Solano, Spruce, Marin, Euclid, Grizzly Peak, Senior, Avenida, Campus, Glendale, La Loma, and Cedar.

Route 7 -- Route 7 links the Euclid corridor to U.C. Berkeley, Downtown, Center Street BART, the Piedmont Area, Claremont Hotel, Rockridge BART and the Chabot-Broadway area of North Oakland. It serves as the eastern border of the grid service.

Route 7 is recommended to go to North Oakland from Euclid via Poplar, Hilldale, Grizzly Peak, Euclid, Hearst, Shattuck, Bancroft/Durant, Piedmont, Warring, Derby, Belrose, Claremont Boulevard, Ashby Avenue, College, Shafter/Keith, Chabot and Broadway to College.

**FIGURE 18
RECOMMENDED
SERVICE PLAN**

LEGEND

BASIC BUS ROUTES —————
PEAK HOUR ROUTE - - - - -



Route 15 -- Route 15 is a composite of existing A.C. Transit service to Oakland and the Colusa portion of route 67. It links the Grove Street corridor with the MacArthur, Ashby, Center Street and El Cerrito BART stations, serves the Berkeley High School, Martin Luther King Junior High School, Solano Shopping District and Albany. It intersects all east-west local routes.

Route 15 originates in Oakland and goes to the El Cerrito BART station via San Pablo, Grove, the Alameda, Solano, Colusa and Fairmont. Replacement service to Terrace Drive is costed for the route 67 service discontinued.

Route 40 -- Route 40 directly links park-and-ride facilities and activities at Golden Gate Fields to residential areas along Gilman, Hopkins, Eunice and Spruce. It also directly links these areas to University Village, U.C. Berkeley, downtown, south campus, Telegraph, Willard Junior High, McArthur BART and Oakland. Route 40 intersects every route in Berkeley.

Route 40 leaves from Golden Gate Fields to downtown Oakland via Gilman, Sixth, Ninth, Jackson, Monroe, San Pablo, Gilman, Hopkins, Eunice, Spruce, Shattuck, Bancroft/Durant, Telegraph to Twelfth St.

Route 43 -- Route 43 is a composite of existing A.C. Transit's route 43 to downtown Berkeley and its route 7 along Arlington north of downtown. It replaces existing local F service along Shattuck.

Route 43 originates near Twelfth Street in Oakland and goes via Telegraph, Shattuck, Woolsey, Adeline, Shattuck, Sutter, the Alameda, Los Angeles and Arlington following the current A.C. Transit route 7.

Route 51 -- Route 51 remains unchanged in Berkeley from the existing successful Route 51M; however, variations 51A, 51C and 58 are eliminated. Route 51 originates at the Berkeley Marina and travels via University Avenue, Shattuck, Bancroft, College Avenue and Broadway in Oakland.

Route 65 -- Route 65 is the same as the existing Dwight Way portion of route 65 serving Cutter Laboratories, Herrick Hospital and U.C. Berkeley, except for more frequent service. Route 65 is recommended to originate at Hearst and Euclid and go via Hearst, Gayley, Piedmont, Haste/Dwight Way, Shattuck, Allston, Grove and Dwight Way to Fourth.

Route 67 -- Route 67 serves a local function of linking the Spruce corridor of the north Berkeley Hills to U.C. Berkeley, downtown and Center Street BART. It also provides access to downtown, BART, and U.C. Berkeley, for College and Alcatraz Avenues residents and access from the Ashby BART station to the Emeryville industrial area. To match bus capacity to ridership, the Spruce Street service was linked with low volume Alcatraz service. This also creates a multi-purpose route which greatly improves access to Berkeley from Alcatraz Avenue.

Route 67 follows its existing path downtown from Spruce Street and then to continue on Shattuck to Bancroft/Durant, College, Alcatraz, Ashby BART, Alcatraz, Sixth, Fifth, Hollis and Yerba Buena to the MacArthur BART station.

Route 72 -- Route 72 continues operating unchanged. It serves a key regional role in the northern portion of the East Bay.

Route 88 -- Route 88 serves as the primary north-south route through the residential area between Shattuck and San Pablo Avenues. The recommended route links El Cerrito Plaza Shopping and the BART station to these residents, as well as the North Berkeley BART station, and downtown Oakland.

Route 88 originates from Twelfth Street and Telegraph and follows its current route along Market to Adeline, Alcatraz, Sacramento, Gilman, Santa Fe, Portland, San Pablo and Fairmont to the El Cerrito BART station.

East Bay Express Routes - One of the two existing East Bay express routes should be dramatically upgraded and the other discontinued.

Route 37 -- Route 37 which serves the Warren Freeway corridor should be upgraded to more frequent service and integrated into the local grid service as shown in Figure 18. The articulated high capacity bus which A.C. Transit hopes to acquire would be ideally suited for this service.

Park-and-ride facilities are needed at the Warren Freeway interchanges to provide the capacity transit service needed by this high travel volume corridor not served by BART. In addition, improvements are required at the Grove Shafter Freeway to allow access to the Warren Freeway. Route 37 would then link the large residential development along the Warren Freeway corridor and Merritt College to BART (at Rockridge). Locally, the route directly links Alta Bates Hospital, Ashby Street, the Coop, the West Berkeley industrial area, University Village and El Cerrito Shopping Center. Since Route 37 also intersects all the major north-south and east-west routes in Berkeley, it also is highly accessible to all areas in Berkeley providing excellent access to and from the Warren Freeway corridor from any place in Berkeley.

Route 37 originates at the El Cerrito BART station and goes to Merritt College via Fairmont, Central Avenue, Frontage Road, Solano, Jackson, Ninth Street, Sixth, Dwight, Crescent, Seventh, Ashby, Ashby BART, Ashby College, Rockridge BART, College, Grove, Shafter and Warren Freeway.

Route 33 -- It is recommended that the existing 33 line be eliminated and the demand it serves be accommodated via BART.

Transbay Service

With the inauguration of direct reliable BART service to Daly City, it is recommended that midday transbay service on the E and F lines be phased out. Peak hour transbay service should be reduced appropriately to complement BART's peak hour capacity. It is anticipated that 40 percent of existing peak hour transbay service will be needed in five years. This service should be concentrated on three simple lines, the E, the F and a modified G. The H line which currently carries less than two percent of Berkeley's total transbay trips (Table 12) should be discontinued. It is replaced by feeder routes to the North Berkeley and Center Street BART stations.

E Route

The E route which carries about 17 percent of the combined transbay patronage of the four existing lines, is needed to serve Claremont Avenue and, therefore, should be continued. The E route should operate only during peak commute hours. During the midday, it should cutback at MacArthur BART rather than providing costly duplication of BART service.

F Route

The F line which carries more than 80 percent of the transbay patronage of the four lines should be continued during the peak hours on reduced headways. The FX and FXX and other variations should be dropped to simplify and consolidate the service. Peak hour F buses would additionally provide improved headways along Shattuck during the peak hours. The phased reduction of peak hour F service, and the discontinuance of midday F service should be closely coordinated with improvements of BART service.

G Route

With the F route providing transbay service on Solano, it is recommended that the G route be diverted from Solano onto Gilman and Hopkins which has relatively indirect access to BART.

Table 12
1973 APRIL TRANSBAY PATRONAGE
Berkeley Coordinated Transit Project

<u>ROUTE</u>	<u>LOCAL</u>	<u>TRANSBAY</u>	<u>TOTAL</u>	<u>PERCENT TRANSBAY</u>
E	8,172	49,300	57,472	86
F	28,535	232,120	260,655	88
G	2,732	3,400	6,132	55
H	<u>2,344</u>	<u>2,320</u>	<u>4,664</u>	50
TOTAL	41,783	287,140	328,923	86

Routing Constraints

During the refinement of the grid concept into a specific routing plan and the review process, it became evident that certain compromises to the Grid concept were necessary. These were generally the result of the hilly topography and narrow streets in the north Berkeley hills, the lack of through streets in the University of California at Berkeley, and the location of BART stations.

Topography - The grid route linking the La Loma area of the Berkeley hills and Shattuck Street is only negotiable with a small 16-23 passenger vehicle. Similarly, sections of Euclid and Spruce make it undesirable to operate standard 40-foot coaches along their routes. These vehicle constraints severely limited through north-south and east-west grid routing options. For example, it is inconsistent to link the Spruce route which requires a narrow 8-foot wide, 35-foot long coach with the Telegraph Avenue route whose heavy patronage requires a wide 8.5-foot wide bus, 40-foot long. Similarly, the 16-23 passenger La Loma bus could not effectively be routed along University Avenue whose heavy patronage requires a full size coach.

University Streets - The lack of north-south streets through the University forced all eastern north-south routes to divert to U.C.'s eastern and western extremities. As such, the directness of the routes were compromised.

BART Locations - Unfortunately, all of the BART stations except the Center Street station were difficult to access with east-west lines. This was particularly true in north Berkeley where three east-west lines; Cedar, Gilman-Hopkins and Solano operate between two BART stations. The choice of which grid components to link together was thus further limited.

In addition to these three principal constraints, and the overall requirements of the grid concept, it was desirable to minimize transfers where possible. For example, direct service seemed desirable from University Village in Albany to the U.C. Campus. Similarly, direct service to the campus was desirable from the north Berkeley hills and from the regional Warren Freeway Corridor. These objectives are embraced in the modified service plan shown in Figure 19. The modified plan sacrifices Warren Freeway access to the west Berkeley industrial area. Analysis indicates that these sacrifices have merit since the Warren Freeway corridor is more closely related to U.C. than to the industrial district and the Dwight Way route changes most of its load at Shattuck.

Schedule of Operation

The success of the GRID method of routing depends on frequent service. Otherwise, transfers take a long time and people are discouraged from riding transit. Table 13 shows the frequency of service recommended for local, express and transbay service. In general, all routes in Berkeley would have a 10-minute or shorter headway during most of the day. Late night and owl service would feature coordinated transfers, where possible.

Service for the Disabled

The recommended service for the disabled in Berkeley would consist of ten small radio dispatched buses equipped with wheelchair lifts and providing service on request or by appointment. The service would provide COORDINATED transit for the disabled and the various community programs in Berkeley. It would replace the separate, and sometimes duplicated or inefficient special services that now operate in Berkeley. The service for the disabled includes the following recommended elements.

FIGURE 19
MODIFIED
SERVICE PLAN

LEGEND

BASIC BUS ROUTES —————

PEAK HOUR ROUTES - - - - -



Table 13
FIFTH YEAR PLAN
SCHEDULE OF RECOMMENDED LOCAL HEADWAYS
Berkeley Coordinated Transit Project

<u>ROUTE</u>	<u>RUSH HOUR</u>	<u>BASE</u>	<u>EVENING</u>	<u>LATE HOUR</u>	<u>OWL</u>
1	10	10	30	60	-
7	10	10	15	60	-
15	10	10	15	15	-
37	10	10	15	30	-
40	5	10	10	15	60
43	5	7.5	15	15	-
51	5	5	10	15	-
65	10	10	15	30	-
67	10	10	15	30	-
72	5	10	10	15	60
88	10	10	15	30	-
E	5	10	15	30	-

Transit Center - The service should be located in a single Transit Center that houses dispatching, management, information, marketing and coordination with community services. The Transit Center would also provide general transit information to all Berkeleyans.

Functions - The service includes the following functions:

- Receiving requests directly from individuals requiring transport; coordinating referrals from Berkeley's social service agencies and taking reservations in advance for group travel (for example, transporting a group of senior citizens to a U.C. Berkeley evening event).
- Scheduling, routing and dispatching the service.
- Providing service information and conducting marketing programs.
- Providing system management.

Coordination - A substantial effort will be needed to coordinate the various social service agencies and community groups who need the service. These coordination efforts should involve:

- Developing a comprehensive picture of social service transportation requirements; identifying duplications or inefficiencies in individual agencies or groups providing transportation services.
- Establishing a program for inter-agency referrals through the central dispatch.
- Procedures for discontinuance of individual agency provision of transportation and contract service by the demand-responsive system. For example, hospitals in Berkeley could contract for patient pick-ups and transfers.

Social services and community groups receiving grants in aid from the City should be encouraged to provide information regarding clientele transportation needs and to use the special demand-responsive service as a condition of grant approval.

Schedule - The service should operate from 7 a.m. continuously until 10 p.m. Monday through Saturday. It could be available seven days a week for groups who make appointments ahead of time. The community should decide priorities to be given to disabled individuals versus groups. However, some suggestions are as follows:

- At first, groups should have priority over individual requests provided that at least five vehicles would always be in demand-responsive operation at a given time. Priorities could be adjusted if indicated.
- No group should have priority over another.
- Clear guidelines should be set as to who can use the system, so that it is not used by people able to ride regular transit, except as the last priority.

Capital and Construction Requirements

The physical facilities that are needed to improve transit in Berkeley include BUSES SHELTERS, a TRANSIT CENTER and SERVICE AND MAINTENANCE FACILITIES, and ROADWAY MODIFICATIONS.

Buses - Detailed analysis of A.C. Transit bus operation schedules is required to determine the precise number of additional vehicles needed to operate the recommended plan. It is estimated that roughly 200 buses are needed for the service. This is approximately 33 more than currently provides Berkeley service. Better buses are needed to improve the efficiency, comfort and convenience of transit in Berkeley. While it is recognized that a uniform bus fleet allows a greater degree of flexibility in the assignment of vehicles to runs, it is recommended that four vehicle types be employed to provide the recommended service; regular 45-

passenger coaches, articulated coaches, small buses, and buses designed for use by the handicapped. Several features should be common to all buses serving Berkeley:

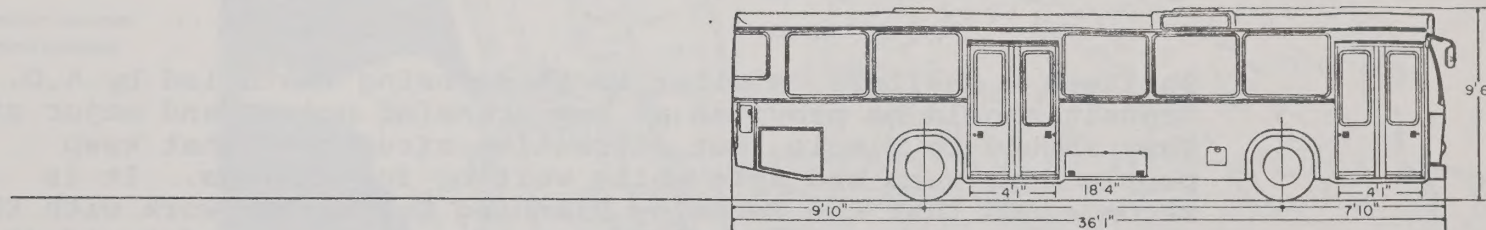
- Getting on and off the bus is easier and considerably faster at crowded stops if buses have WIDE AUTOMATIC DOORS and LOW FLOORS. The German bus shown in Figure 20 has doors more than four feet wide almost double the door width of the GMC buses currently used in Berkeley and most other American cities. Use of the German style bus in Berkeley would make the loading and unloading of the pull-type grocery carts much easier than can be currently done. It would also greatly speed up loading and unloading on the heavily utilized routes, such as College Avenue, where 15 to 30 percent of the trip time is not taken up just by loading and unloading passengers.
- Buses should be provided with racks for packages and carts in the area behind the drivers.
- Buses should carry better on-board TRANSIT INFORMATION. For example, transit route maps showing the streets that the route takes, transfer connections and key destinations should be displayed behind the driver. The rear window should display the route number.

It is recommended that Berkeley vigorously support A.C. Transit's plan to acquire articulated buses with 80 plus passenger capacity. These vehicles are ideally suited for operation on Routes 37, 51 and 40 in the near future. As ridership increases, particularly on Routes 51 and 37, still greater capacity vehicles may be needed. Berkeley should begin exploring alternatives now, including those mentioned in the Selected Transit Physical Improvements for Berkeley report.

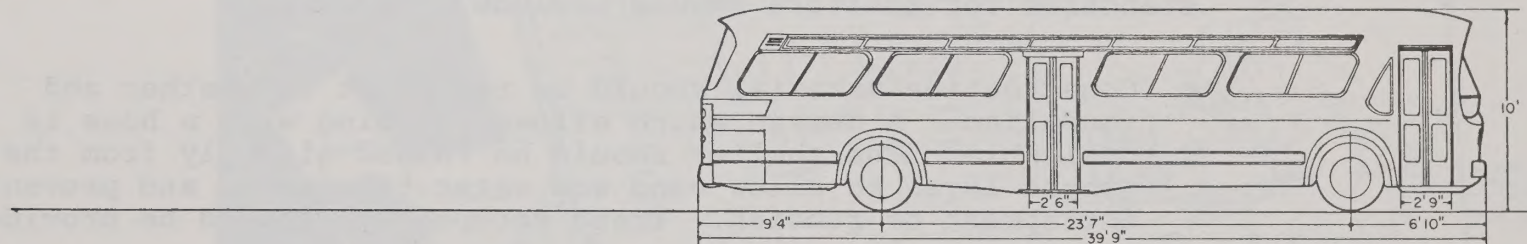
Small 16-25 passenger buses are needed to serve Route 1 along La Loma.

FIGURE 20
ALTERNATIVE TRANSIT VEHICLES

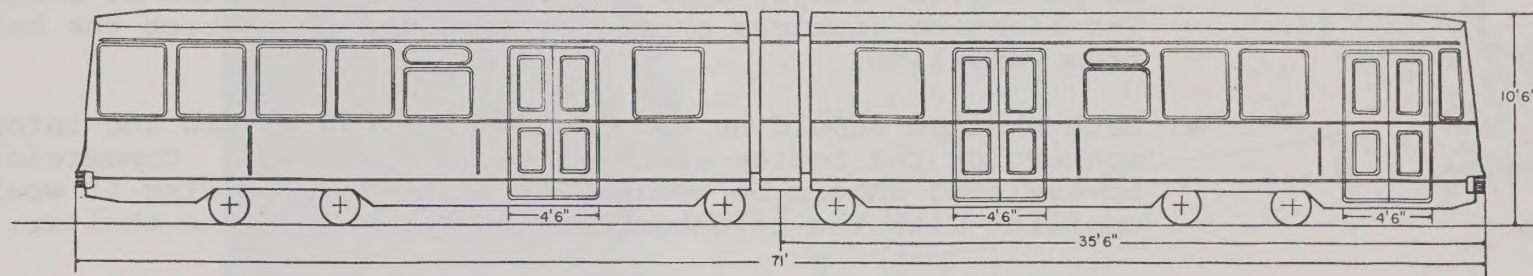
STANDARD GERMAN CITY BUS



STANDARD AMERICAN CITY BUS



NEW STREET CAR FOR SAN FRANCISCO



Vehicle specifications for the service for the disabled should include:

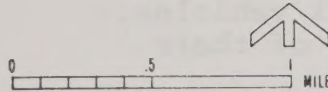
- radio equipment
- structural stamina for carrying wheelchairs
- wheelchair lifts
- a system to keep wheelchairs stationary when the bus is in motion and during emergency stopping.
- information aids for the blind and deaf.

Shelters - Shelters, similar to those being installed by A.C. Transit should be provided at key transfer points and major stops. They should be simple, but attractive structures that keep people dry, warm and safe while waiting for the bus. It is recommended that the Berkeley Planning Department work with the community to create several designs for shelters and to identify desired locations. Figure 21 indicates 80 desirable locations for bus shelters in Berkeley for which costs were considered. Design standards for shelters should include:

- Construction material should be resistant to weather and vandalism. A design which allows cleaning with a hose is desirable. The shelter should be raised slightly from the ground level to allow wind and water to escape, and prevent entrapment of rubbish. Trash receptacles should be provided.
- Transparent materials and lighting to let people read or look around while waiting for the bus, thereby reducing the amount of perceived waiting time and increasing the sense of security. The lighting fixtures should be designed to protect the bulb from vandalism.
- Each shelter should be provided with a system map and information concerning the routes which serve that shelter. Commercial advertising should be sought for shelters providing it would not conflict with the neighborhood environment of the shelter.

FIGURE 21
PROPOSED
SHELTER LOCATIONS
AND NEEDED STREET
IMPROVEMENTS

LEGEND
PROPOSED BUS SHELTER LOCATIONS ●
EXISTING BUS SHELTER LOCATIONS ○



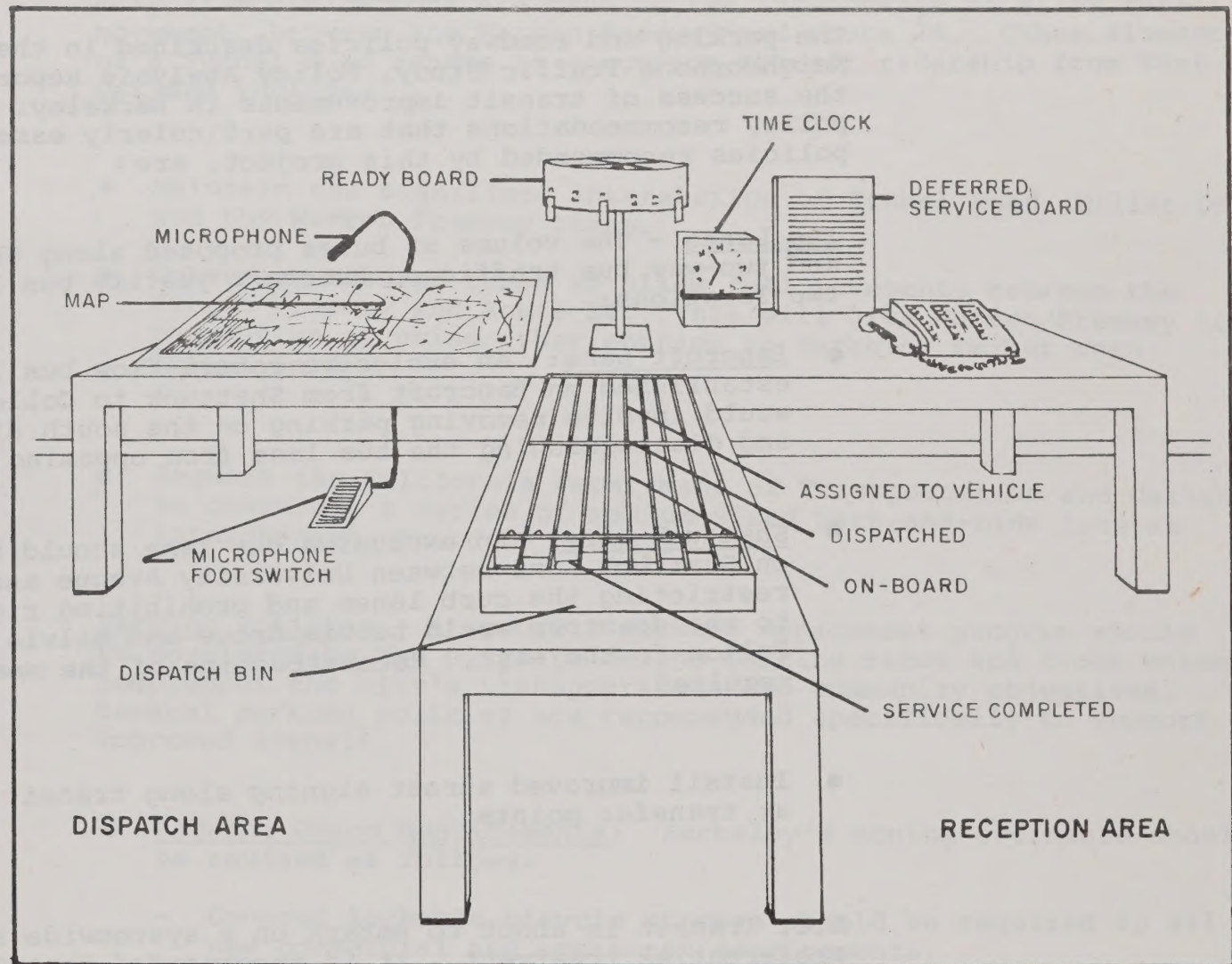
- If ponding conditions exist in front of proposed shelter locations, they should be remedied to prevent waiting riders from being splashed by passing motorists. Also the effect of the shelter location on intersection sight distances should be assessed before constructing the facility.
- Larger shelters at major stops could also include: bicycle lockers, concessions, drivers' washrooms, a telephone and other conveniences.

Transit Center - There are several transit functions proposed for Berkeley including: information and planning, dispatching and management of service for the disabled and coordination with other transit operators and services. These could be housed in a central location to be available to all Berkeleyans. Figure 22 shows a suggested layout plan for such a dispatch center. The communications equipment should allow bypass of incoming calls directly to buses in order to provide the flexibility of driver dispatching for late night special service if it is provided later.

Maintenance Facilities - About 200 buses will be needed to operate improved transit in Berkeley. These must be maintained, repaired and when not in service parked. A.C. Transit or the BUSD would perform these functions.

A.C. Transit's maintenance capabilities are first rate and have won several industry awards. The maintenance responsibilities are divided into four divisions: Division 2 in Emeryville, Division 3 in Richmond, Division 4 in East Oakland and Division 6 in Newark. Division 2 in Emeryville services approximately 300 vehicles compared to 150 Richmond and 350 at East Oakland. Berkeley's A.C. Transit service is primarily supported from the Emeryville maintenance facility. This is a relatively old facility with maintenance pits rather than hoists. A cursory inspection indicates it is equipped to perform both major and minor maintenance and repair work. Vehicle storage (outdoor) appears fully utilized and more parking may be needed to service additional vehicles. A.C. Transit plans to conduct a comprehensive study of their

FIGURE 22
DISPATCH AND RECEPTION AREA



maintenance needs, to "keep pace" with other service expansions. The expanded fleet needed to operate the recommended Berkeley plan should be an input to that study.

Parking and Roadway Policies

The parking and roadway policies described in the Berkeley Neighborhood Traffic Study, Policy Analysis Report are crucial to the success of transit improvements in Berkeley. Some of the policy recommendations that are particularly essential, along with policies recommended by this project, are:

Bus Lanes - The volume of buses proposed along Shattuck Avenue and two-way bus traffic on Bancroft justify bus lanes in these two locations:

- Bancroft Lane: An exclusive contra-flow bus lane should be established on Bancroft from Shattuck to College Avenues. This would involve removing parking on the south side of the street and distinguishing the bus lane from opposing traffic lanes.
- Shattuck Lane: An exclusive bus lane should be established on Shattuck Lane between University Avenue and Durant by restricting the curb lanes and prohibiting right turns. Access to the downtown would be via Grove and Milvia to the west and Fulton to the east. Reconstruction of the median would be required.
- Install improved street signing along transit routes particularly at transfer points.

A.C. Transit is about to embark on a systemwide study of transit preferential treatment. It is recommended that College and University Avenues, Hearst Street and Berkeley's BART station

access points be included in this detailed study. Significant potential for improved service can be achieved on these streets.

Tunnel Road - The recommended program includes dramatic upgrading of Route 37 serving the Warren Freeway corridor. This route can reach the Rockridge BART station, and Berkeley directly and quickly only if modifications are made to the interchange to allow full movement between the Warren Freeway and Route 24. Other elements of a Tunnel Road scheme to encourage transit ridership from East Oakland include:

- Maintain the signalized intersection of Tunnel Road, Hiller Drive and the Warren Freeway ramps.
- Construct missing ramps to allow full movements between the Warren Freeway and Route 24. This will give Warren Freeway traffic the option of using other entries to Berkeley rather than Tunnel Road.
- Request the California Department of Transportation and Oakland to construct a series of medium-sized park-and-ride lots at interchanges served by Route 37.

Parking Policies - A specific parking management program should be developed by the city, to define parking rates and fines which complement the city's transportation and community objectives. Several parking policies are recommended specifically to support improved transit.

- Parking Space Requirements: Berkeley's zoning ordinance should be revised as follows:
 - Covered lockable bicycle storage should be required in all new commercial and apartment developments.

- Apartment developments should not be required to provide as much parking if adjacent to an arterial street with transit service.
- The Master Plan revision should recommend an upper limit to the provision of parking in commercial development areas.
- Policies recommended for the U.C. Berkeley campus should be vigorously pursued. These are:
 - a. Eliminate most on-campus surface parking (1,500 spaces); exceptions would be granted to disabled persons and those with special need of their cars during the day.
 - b. Raise all remaining parking space fees to levels approaching the local commercial rates in Berkeley. Revised fees should permit amortization of parking structures through direct charges on spaces provided -- not by diversion of funds from surface parking (note -- current U.C. parking charges have not changed since 1966).
 - c. Reallocate all U.C. parking spaces based on need to drive and size of car pool. Car pools of three or more may be given preferential spaces and reduced parking rates.
 - d. Implement continuing car pool commuter matching program for both staff and students.
 - e. Use campus parking fines and excess revenues to support transit operating costs.
 - f. Discourage new parking facilities near campus.

Bicycle Access

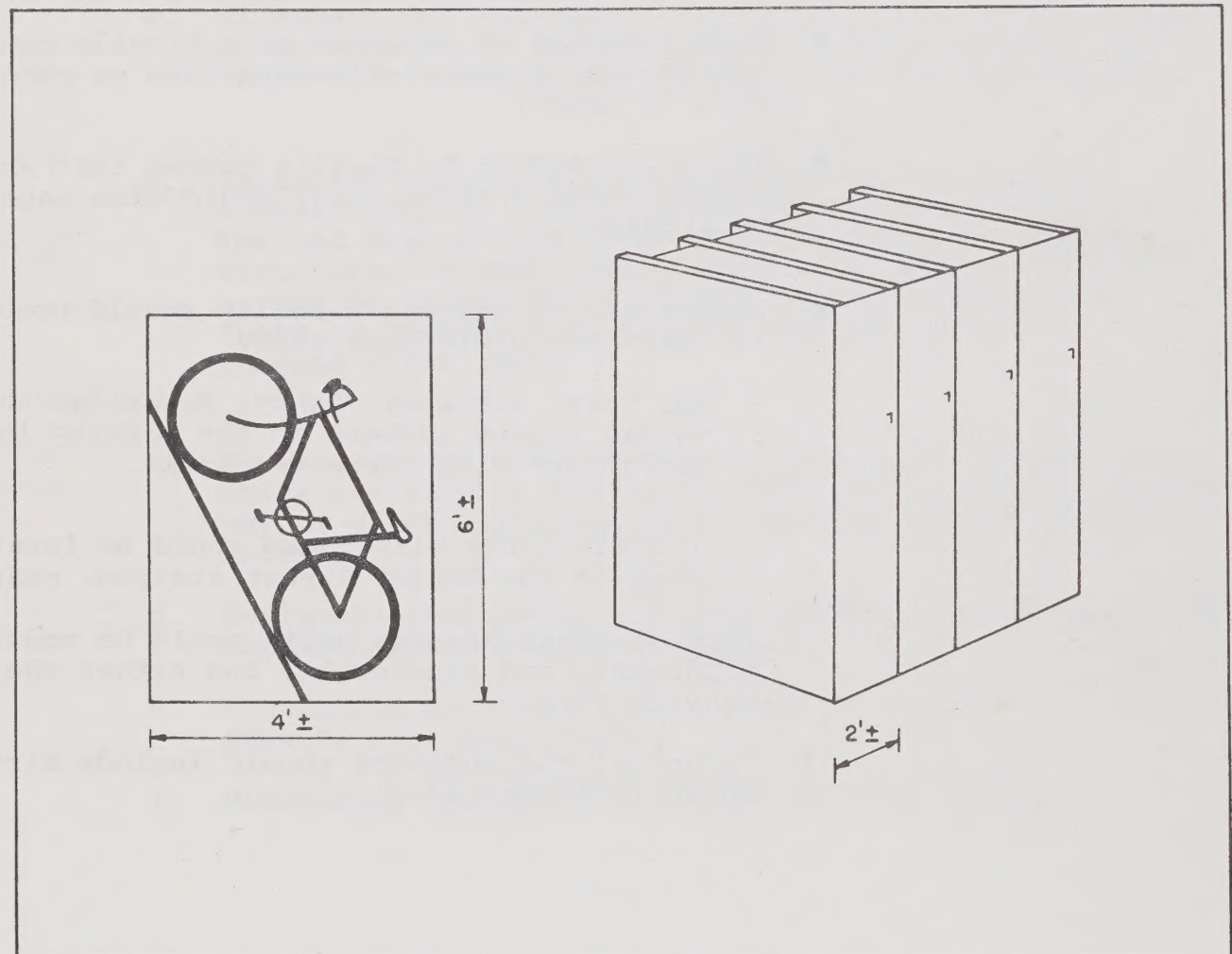
Generally, it is recommended that bicycle access to transit be provided by a modification and upgrading of the City's existing bicycle route system, and free bicycle storage.

- The vacant BART lands should be used for a pedestrian bike facility improving access to the North Berkeley BART station.
- Durant should be improved as a bicycle route if Bancroft is to incorporate a contra-flow bus lane as recommended later on in this document.
- The improvements to bicycle routes that are recommended in the Neighborhood Traffic Study would also generally improve access to transit.
- BART stations serving Berkeley should provide free storage for at least 25-30 bicycles each.
 - The North Berkeley, Ashby, Rockridge and El Cerrito stations should locate lockers in the parking lot which the cyclists can secure with their own locks.
 - Bicycle racks with locks could be located in the free area of the Center Street station, near the attendant.

Both of these storage units could be modular in design, mass producible and expandable, and either the City or BART might provide them.

- Principal bus shelters should include bicycle lockers as shown in Figure 23.

FIGURE 23
POSSIBLE BICYCLE STORAGE LOCKER



Bicycles on BART during off-peak hours is a good start towards accommodating bicycles on transit. But loading bicycles on and off buses in regular service would be a considerable inconvenience both to the cyclist and other transit riders and thus is generally not recommended. However, the proposed route 1 should be equipped with a bicycle rack experimentally. The liability of the A.C. Transit and the City for "contributing to the negligence" of pranksters who get hurt jumping or hanging on to the bike rack should be determined before deciding the desirability of using bike racks on this route.

OWNERSHIP AND MANAGEMENT

Proper ownership controls and effective management are often the difference between a mediocre and a successful public transportation service. The recommended service plan includes three principal service components; regional service, local Berkeley service and special services. The Project analyzed the individual needs of each of these service components regarding respective ownership and management frameworks. Alternatives were evaluated based on institutional feasibility, public responsiveness and cost effectiveness.

Ownership

Ownership is used in this report to describe control over physical assets and fiscal responsiveness. Important considerations regarding optimum ownership responsibility include:

- Legal Authority
- Planning and Design
- Construction
- Operation
- Financing
- Safety
- Public Accountability
- Compatibility with Management Entity.

Legal Authority - Berkeley, along with other California municipalities, is empowered by the California State Constitution Article XI, Section 19 to "establish and operate public works for supplying its inhabitants with transportation". More complex alternatives could include the City of Berkeley entering into a joint powers agreement with either A.C. Transit, U.C. Berkeley, BART, or the Berkeley Unified School District to provide transit. Less desirable alternatives include: a community service district, an improvement district or a non-profit corporation. Private ownership is also a possibility.

Planning and Design - The City of Berkeley is participating in the planning and design of local transit under the auspices of this Project; the City intends to continue transit planning as an on-going municipal function similar to traffic engineering. This is clearly desirable, since Berkeley potentially knows best its local transit needs. However, integrating the City's plans with those of A.C. Transit is presently a cooperative process. The recommended GRID route reorganization provides a clearer distinction than present routing between East Bay and local transit service, and could be the basis for greater local transit planning autonomy. On the other hand, local and regional service are related and mutually supportive.

Construction - The City of Berkeley appears to have more resources than A.C. Transit or BART to implement the physical improvements recommended. Similarly, the City is a more effective political organ through which pressure can be brought to bear on CALTRANS to construct the recommended portion of the Grove Shafter-Warren Freeway Interchange.

Operation - Ownership other than by the agency managing the service introduces complex vehicle assignment and maintenance problems. Ownership by the City, however, virtually assures the City of the bus types it considers most desirable for its service.

Financing - The financial responsibility includes the power to levy taxes, incur indebtedness, set fare policies and enter into other financial arrangements. The substantial amounts which may be obtained under State and Federal programs make it mandatory that the ownership entity qualify for these funds. This is, of course, true of A.C. Transit. Were Berkeley to assume financial responsibility for local transit through ownership, the City would have direct control over the acquisition and expenditure of transit monies; it would be accountable for the efficient expenditure of funds in providing local service, and liable for debts and losses incurred. Alternatively, the City could provide the additional support for transit discussed in the next section of the report, and have some say about the expenditure of these funds, through a joint powers agreement or special benefit district. Private groups generally do not qualify for State and Federal transit funds. Currently, provisions in the Transit Development Act would prevent the City or the Berkeley Unified School District from receiving TDA funds.

Safety - The determination of safety requirements and the certification that local transit is operating with safe practices is a factor in considering any new ownership arrangement. Were Berkeley or another entity to assume ownership of local transit and contract the operation of service, the question of responsibility for safe practices and liabilities would arise.

Public Accountability - More direct accountability of the local transit owner to the people served can result in responsive transit service improvement. A.C. Transit and BART are accountable to Berkeley through their elected directors. If the City became the owner of local service, it would normally be accountable through the municipal political process. However, if the owner of local service is a special district, joint powers agreement or non-profit corporation, then the organization of this entity to insure public accountability will be essential.

Management Functions

Under all forms of ownership for local transit in Berkeley, various management functions must be provided. Nine principal management functions were considered in the evaluation:

- Transportation
- Planning and Research
- Design and Construction
- Maintenance and Servicing
- Accounting and Fiscal
- Safety
- Public Relations and Marketing
- Personnel and Employee Relationships
- Claims and Legal

Management

Management of day-to-day operations can be accomplished by several basic arrangements including:

- A.C. Transit
- City of Berkeley
- Berkeley Unified School District
- Private Management Consultant
- Individual Agencies

Management by A.C. Transit would likely be most efficient and easiest to coordinate with regional service; however, it would not provide the degree of local control as if the City managed the service. The City currently lacks experience in the field of transit management. While the Berkeley Unified School District has the necessary experience and more local control than A.C. Transit, conflicts could possibly arise between their primary function and that of local bus service in the way of maintenance scheduling, cost allocation and the assignment of top drivers. Private management consultants would not probably be cost effective

for the recommended service plan. Finally, management by individual agencies is inefficient, uncoordinated and generally difficult to control.

Recommendations

It is recommended that the City negotiate a mutually agreeable contract with the A.C. Transit District to own and manage the regional and local service components of the recommended plan. It is also recommended that the city contract with a non-profit agency such as the Center for Independent Living to provide services for the handicapped and that the Humphrey Go BART services be continued as are. The supportive reasoning for these recommendations are as follows:

Regional Service - BART and A.C. Transit currently provide regional transit service to Berkeley. Operation of Berkeley's regional bus service by someone other than A.C. Transit would create confusion and lead to uncoordinated service. Schedule coordination would be difficult, fare and transfer provisions confused. In light of these problems and A.C. Transit's efficient management experience, it is recommended that they manage the regional component of the service plan. In order to minimize service and maintenance conflicts and administrative bookkeeping, it is also recommended that A.C. Transit own the required buses.

Local Service - Management of local service by A.C. Transit will minimize institutional and passenger conflicts. With A.C. Transit providing both regional and local bus service, late night coordinated transfers would be easier to design, fare and transfer problems, labor conflicts and passenger confusion minimized. Route modifications would also be less restricted if one agency were to operate the entire general bus service. For similar reasons as stated above, it is recommended that A.C. Transit own the necessary buses. Conditions within the contract for additional service can guarantee stronger local control of local service.

Special Services - Since the demand responsive service for the handicapped is designed to serve only those persons not able to use regular bus service, it is in essence a totally separate service. Recognizing this independence and the local nature of the service, it is recommended that the City contract with an interested local non-profit agency to manage this service. Logistics, operating economy, and a greater degree of local control favor this arrangement. The Center for Independent Living which has local experience providing this type of service should be contacted to see if they are interested in expanding their key role.

It is recommended that the City maintain ownership of these vehicles and that one of the duties of the City's transit coordinator be to inspect the maintenance and the use of these vehicles. Since liability claims will likely be high on this type of service, the contract between the non-profit operating agency and the City should fix liability on the former since it employs the driver and maintains the vehicles. If liability is not fixed in the contract, disputes will inevitably arise between the two parties as to the cause of the accident, the driver employed by the non-profit agency or the vehicle owned by the city.

The success of Humphrey Go BART suggest that it continue operation as it is now.

Local Control

The recommended ownership and management relationships just described do not by themselves provide the degree of local control which is needed for Berkeley's transit services. In order to increase Berkeley's control, two committees should be established to advise Berkeley's representatives on the BART and A.C. Transit Boards, as well as to coordinate other local transportation actions.

The City currently is building the framework necessary to coordinate local and regional transportation. Administratively, a Department of Transportation has been formed to coordinate the implementation of traffic, parking and transit programs. A transit coordinator has been hired to coordinate regional, local and special transit services.

A citizens and a technical committee is recommended to advise and support transportation policy makers as to local desires regarding A.C. Transit, BART and special services. Both committees should be responsible for all modes of travel.

The citizens committee should be comprised of: a representative cross section of the City chosen by neighborhoods or the City Council, Board members from BART, A.C. Transit and the Unified School District, and representatives from the Berkeley Chamber of Commerce and the City. The citizens transportation committee should review and advise policy makers concerning transit service adjustments, fare policies, roadway and traffic programs, parking policies and other transportation considerations. The City of Walnut Creek currently has such a committee.

The technical advisory committee should be comprised of representatives from the Planning Department, Public Works Department, U.C. Berkeley, Berkeley Unified School District, the Center for Independent Living and Berkeley's BART and A.C. Transit staff members. CALTRANS should be invited to attend sessions related to their highway domain.

With regard to transit advocacy, the City's transit coordinator should function as a catalyst to stimulate thought and communications. The coordinator should vigorously support transit related improvements in neighboring communities which support Berkeley's own objectives.

Fares Policy

Improvements to fares policies can encourage more people to ride transit in Berkeley.

- After careful review the Project concluded that only a few more people would use transit if fares were lower than 25¢. Increasing the fare to cover 40 percent of the operating costs with farebox revenue as proposed by the States Legislative Analyst, however, would significantly inconvenience local riders. The existing 25 cent fare is easily remembered and is conveniently paid with a single coin. Thus, a basic single ride fare of 25 cents should be maintained for local service, including service for the disabled. A.C. Transit, Transbay and BART zone fare structures should be coordinated at the same cost level.
- The University of California and A.C. Transit should negotiate a lump-sum contract for pass-service for students and employees. A study by A.C. Transit and the U.C. Berkeley Community Affairs Committee indicated every student could be issued a \$2.50 monthly pass, yielding A.C. Transit more revenue than it gets now. Similar contract pass service could be provided municipal employees.
- Berkeley should explore a more general use of passes, possibly arranging to send residents monthly passes and automatically bill their charge accounts.
- A program should be started to promote the validation of transit fares by merchants who do not validate parking and to require merchants who do validate parking to validate transit to the same monetary amount. Alternatively, merchants could be rebated from a business tax surcharge the amount they spend on ticket validation annually.

- Berkeley should participate in studies of regional fare coordination to allow two-way free transfer between BART, A.C. Transit and local transit.
- It is also recommended that the City request MTC to raise the Bay Bridge toll to match transbay transit fares.

Marketing - Both A.C. Transit and BART have excellent existing Marketing programs and are constantly making improvements. A.C. Transit's existing route map, however, is relatively difficult to read. It is recommended that A.C. Transit develop a multi-color systemwide pocket size route map. While the multi-colored maps are more expensive to produce, the complexity of A.C. Transit service warrants it. Informational maps are also needed at key activity areas in the city such as City Hall, Herrick and Alta Bates Hospital and U.C. activity centers. Sub-regional information maps are also needed.

IMPLEMENTATION AND FINANCIAL PROGRAMS

Recognizing that the timing of convenient and direct BART service to San Francisco has an important bearing on opportunities to reorient transbay service to local Berkeley service, a five-year implementation and financing program was developed principally as a guideline. In general, it assumes full BART service in the third year, 1979. The implementation phasing should be adjusted appropriately, depending on the actual date of full operation.

The recommended plan which provides ten-minute or better midday service, on virtually all of Berkeley's major thoroughfares is an expensive program requiring a full commitment of the community to its stated goals of significantly reducing automobile traffic within the City.

Phasing - A principal assumption on which the recommended phasing plan is built, is that BART will begin full transbay service in 1979. The phased reduction of direct peak hour transbay service and elimination of direct midday transbay service, therefore, begins at this date. The general strategy underlying the phasing program was to immediately implement the principal north-south route modifications and to increase frequencies on existing east-west service the first year. This approach defers the decision between the recommended plan and the modified plan strategies of east-west service improvements until 1979. At this time, with insight gained through on-board surveys and an indepth review by the public, the city should be better able to decide the best strategy. Transbay service is gradually reduced until it represents approximately 55 percent of existing peak hour transbay service from Berkeley. Table 14 describes the phased implementation of individual routes.

Financing - The City of Berkeley will have to significantly increase its transit subsidies in order to implement the program. Increased commitment would also be necessary to maintain its existing service. The recommended plan is estimated to require \$13,621,200 subsidy in 1981, and to have a total capital cost of \$3,372,000.

Berkeley does not have sufficient funds to support this plan under existing fare schedules, and transit funding program.

Tables 15 and 16 describe the operating and capital funding requirements of the recommended plan. To provide some perspective to these costs, it is estimated that existing A.C. Transit service would cost approximately \$11,400,000 to operate in 1981 and would produce about \$5,000,000 in operating revenue, resulting in an operating deficit of \$6,400,000 in 1981 for Berkeley lines. The recommended plan, however, should increase BART's revenue by more than \$2,000,000 annually, thus reducing its subsidy needs.

On a per capita resident basis, the difference between doing nothing and implementing the recommended plan amounts to \$35 annually in 1981.

NUMBER	DESCRIPTION	YEAR 1						YEAR 2						YEAR 3					
		HEADWAYS ^{1/}			DAILY			HEADWAYS ^{1/}			DAILY			HEADWAYS ^{1/}			DAILY		
		Peak	Base	Even.	Nite	Owl	Trips Miles	Peak	Base	Even.	Nite	Owl	Trips Miles	Peak	Base	Even.	Nite	Owl	Trips Miles
E	Transbay	15	-	20	-	-	25 575	15	-	20	-	-	25 575	15	-	20	-	-	16 368
F	MacArthur BART (7.5)	15	-	-	30	-	60 462	(7.5)	15	-	30	-	60 462	(7.5)	15	20	30	-	69 531
	Transbay	5	15	15	15	60	113 3164	5	15	15	15	60	113 3164	10	15	15	-	60 81 2106	
G	MacArthur BART	-	-	-	-	-	0 0	-	-	-	-	-	0 0	-	-	-	15	-	8 120
	Transbay	12	-	-	-	-	21 546	12	-	-	-	-	21 546	-	-	-	-	-	0 0
H	Recommended	-	-	-	-	-	0 0	-	-	-	-	-	0 0	12	-	-	-	-	20 520
	Transbay	10	-	-	-	-	23 597	10	-	-	-	-	23 597	15	-	-	-	-	16 416
I	Recommended ^{2/}	-	-	-	-	-	0 0	-	-	-	-	-	0 0	15	15	30	-	-	62 1290
7	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0	-	-	-	-	-	0 0
15	Recom. with Grizzly Park	10	20	-	-	-	54 1004	10	20	-	-	-	54 1004	-	-	-	-	-	0 0
	Recommended	-	(10)	30	60	-	38 536	-	(10)	20	60	-	38 536	10	10	30	60	-	92 1297
	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0	-	-	-	-	-	0 0
	El Cerrito BART (10)	(10)	(10)	15	30	-	82 1542	(10)	(10)	15	30	-	82 1542	(10)	(10)	15	30	-	82 1542
17	Shavlin Drive	30	60	-	-	-	18 398	30	60	-	-	-	18 398	30	60	-	-	-	18 398
	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0	-	-	-	-	-	0 0
33	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0	-	-	-	-	-	0 0
37	Existing	20	30	60	-	-	35 749	20	30	60	-	-	35 749	-	-	-	-	-	0 0
40	Rockridge - El Cerrito	-	-	-	-	-	0 0	-	-	-	-	-	0 0	(10)(15)	(30)	30	-	-	39 651
	Warren Pwy - El Cerrito	-	-	-	-	-	0 0	-	-	-	-	-	0 0	20	30	60	-	-	35 980
	Existing	-	-	15	15	60	25 283	(5) (10)	15	15	60	79 893	-	(10)	15	15	60	55 621	
	Recommended	10	15	-	-	-	64 1197	10	20	-	-	-	54 1010	10	20	-	-	-	54 1010
43/43A	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0	-	-	-	-	-	0 0
51/58	Recom. Arlington Ct.	(7.5) (10)	15	30	-	-	85 1640	(7.5) (10)	15	30	-	-	85 1640	(5) (10)	15	30	-	-	85 1640
	Recom. Barrett	15	90	-	-	-	23 582	15	90	-	-	-	23 582	15	90	-	-	-	23 582
	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0	-	-	-	-	-	0 0
	Recommended	5	7.5	10	15	-	154 2895	5	5	10	15	-	194 3647	5	5	10	15	-	194 3647
65	Existing	15	15	30	30	-	66 1294	15	15	30	30	-	66 1293	-	-	-	-	-	0 0
	Recommended	-	-	-	-	-	0 0	-	-	-	-	-	0 0	10	15	30	30	-	74 636
67	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0	-	-	-	-	-	0 0
	MacArthur BART	20	-	-	-	-	12 281	20	-	-	-	-	12 281	20	-	-	-	-	12 281
72	San Pablo Ave. (10)	15	15	30	-	-	68 1204	(10)	15	15	30	-	68 1204	(10)	15	15	30	-	68 1204
	Existing	10	10	10	15	60	115 2875	10	10	10	15	60	115 2875	10	10	10	15	60	115 2875
73A	El Cerrito BART	-	-	-	-	-	0 0	(5)	-	-	-	-	24 355	(5)	-	-	-	-	24 355
	Existing	30	-	-	-	-	8 96	30	-	-	-	-	8 96	-	-	-	-	-	0 0
88	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0	-	-	-	-	-	0 0
TOTAL ROUTE MILEAGE	Recommended	10	10	15	30	-	100 1750	10	10	15	30	-	100 1750	10	10	15	30	-	100 1750
							23670						25199						24790

1/ () indicates combined headway of long and short variations of the same route.
2/ Four peak hours, 10 base hours, three evening hours, two nite hours and five owl hours of service assumed.
3/ Includes clockwise and counterclockwise service.

ROUTE	DESCRIPTION	YEAR 4						YEAR 5					
		HEADWAYS ^{1/}			DAILY			HEADWAYS ^{1/}			DAILY		
		Peak	Base	Even.	Nite	Owl	Trips Miles	Peak	Base	Even.	Nite	Owl	Trips Miles
E	Transbay	15	-	20	-	-	16 368	15	-	20	-	-	16 368
F	MacArthur BART	(5)	10	15	30	-	108 832	(5)	10	15	30	-	108 832
	Transbay	10	15	-	-	60	69 1932	7.5	-	-	-	60	37 1036
G	MacArthur BART	-	(7.5)	-	15	-	48 720	-	-	-	-	-	0 0
	Transbay	-	-	-	-	-	0 0	-	-	-	-	-	0 0
	Recommended	12	-	-	-	-	20 520	10	-	-	-	-	24 624
H	Transbay	-	-	-	-	-	0 0	-	-	-	-	-	0 0
I	Recommended ^{3/}	10	15	10	60	-	72 1498	10	10	30	60	-	92 1914
7	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0
	Recom. with	-	-	-	-	-	0 0	-	-	-	-	-	0 0
	Grizzly Park	10	10	30	60	-	92 1297	10	10	15	60	-	98 1382
	Recommended	-	-	-	-	-	0 0	-	-	-	-	-	0 0
15	Existing	(10)	(10)	15	30	-	82 1542	(10)	(10)	15	15	-	86 1617
	El Cerrito BART	30	60	-	-	-	18 398	30	60	-	-	-	18 398
	Shavlin Drive	-	-	-	-	-	0 0	-	-	-	-	-	0 0
17	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0
33	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0
37	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0
	Rockridge - El Cerrito	-	(15)	(30)	30	-	27 451	-	(10)	(15)	-	-	36 601
	Warren Pwy - El Cerrito	10	30	60	-	-	47 1316	10	20	30	30	-	64 1792
40	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0
	Recommended	10	10	15	15	60	109 2038	5	10	10	15	60	139 2599
43/43A	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0
	Recom. Arlington Ct.	(7.5) (10)	15	30	-	-	85 1640	(5) (7.5)	15	15	-	-	125 2412
	Recom. Barrett	15	90	-	-	-	23 582	15	90	-	-	-	23 582
51/58	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0
	Recommended	5	5	10	15	-	194 3647	5	5	10	15	-	194 3647
65	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0
	Recommended	10	10	30	30	-	94 808	10	10	15	30	-	100 860
67	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0
	MacArthur BART	20	-	-	-	-	12 281	20	-	-	-	-	12 281
	San Pablo Ave. (10)	10	15	30	-	-	88 1558	(10)	10	15	30	-	88 1558
72	Existing	10	10	10	15	60	115 2875	10	10	10	15	60	115 2875
	El Cerrito BART	(5)	-	-	-	-	24 355	(5)	-	-	-	-	24 355
73A	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0
88	Existing	-	-	-	-	-	0 0	-	-	-	-	-	0 0
	Recommended	10	10	15	30	-	100 1750	10	10	15	30	-	100 1750
	TOTAL ROUTE MILEAGE						26408						27483

Table 15

SCHEDULE OF OPERATING COST

Berkeley Coordinated Transit Project

	YEAR				
	1977	1978	1979	1980	1981
<u>OPERATING COSTS</u>	\$	\$	\$	\$	\$
Local	9,445,800	10,929,700	12,306,700	14,257,600	16,765,300
Transbay	1,772,100	1,896,200	1,417,200	1,254,000	964,900
Special Services	-	435,000	465,000	498,000	533,000
Humphrey-Go-Bart	130,000	139,000	149,000	159,000	170,000
Total	11,347,900	13,399,900	14,337,900	16,168,600	18,433,200
<u>OPERATING REVENUE</u>					
Transbay Fares	1,489,000	1,489,000	1,040,100	860,100	618,500
Local Fares	2,897,500	3,187,300	3,477,000	3,708,900	4,056,500
Special Service	-	20,000	25,000	30,000	37,000
Humphrey-Go-BART	-	-	-	-	-
Other Revenue ⁽⁵⁾	100,000	100,000	100,000	100,000	100,000
Total	4,486,500	4,796,300	4,642,100	4,699,000	4,812,000
<u>SUBSIDY REQUIREMENTS</u>					
Berkeley Mileage	3,773,800	4,732,000	5,332,700	6,308,300	7,491,700
Non-Berkeley Mileage	3,127,600	3,871,600	4,363,100	5,161,320	6,129,500
Total	6,861,400	8,603,600	9,695,800	11,469,600	13,621,200
<u>BERKELEY SUBSIDY RESOURCES</u>					
A.C. Transit Property Tax	1,335,000	1,450,000	1,552,000	1,660,000	1,776,000
TDA Sales Tax ⁽¹⁾	590,000	633,000	676,000	723,000	774,000
UMTA Operating Assistance ⁽¹⁾	490,000	584,000	640,000	678,000	678,000
U.C. Parking Fines ⁽²⁾	130,000	139,000	149,000	159,000	170,000
Total	2,545,000	2,806,000	3,017,000	3,220,000	3,398,000
NON-BERKELEY SUBSIDY ⁽³⁾	1,915,000	2,049,000	2,192,000	2,346,000	2,510,000
TOTAL SUBSIDY RESOURCES	4,460,000	4,855,000	5,209,000	5,566,000	5,908,000

(1) Assume 25 percent of UMTA and TDA funds assigned to BART.

(2) Assumes parking fine revenue sufficient to meet cost of Humphrey-Go-Bart.

(3) A.C. Transit subsidy for current Berkeley service from Oakland and other cities which share service.

(4) Assumes UMTA Operating Assistance Program continued at about the same level of funding.

(5) Assumes a portion of A.C. Transit's Charter Advertising etc. revenue can be assigned to Berkeley.

Table 16
CAPITAL IMPLEMENTATION SCHEDULE^{1/}

	<u>YEAR 1</u>	<u>YEAR 2</u>	<u>YEAR 3</u>	<u>YEAR 4</u>	<u>YEAR 5</u>
<u>CAPITAL COSTS</u>	\$	\$	\$	\$	\$
Buses					
Transit ^{1/2/}	975,000	963,000	684,000	-	-
Special Service ^{3/}	-	647,000	-	-	-
Shelters ^{4/}	100,000	27,000	29,000	31,000	33,000
Dispatch Center	<u>50,000</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
	1,125,000	1,637,000	713,000	31,000	33,000
Annual Depreciation ^{5/}	363,000	388,000	416,000	445,000	476,000
Capital Funding					
UMTA	290,000	311,000	332,000	356,000	380,000
TDA	<u>73,000</u>	<u>77,000</u>	<u>84,000</u>	<u>89,000</u>	<u>96,000</u>
TOTAL	363,000	388,000	416,000	445,000	476,000

^{1/} Estimate includes vehicles required plus ten percent spares.

^{2/} Assumes \$75,000 cost per vehicle.

^{3/} Assumes \$55,000 cost per vehicle.

^{4/} Assumes \$2,500 cost per shelter.

^{5/} Twelve year life assumed for buses and 20 year life for others.

Capital costs are largely dependent on the need for A.C. Transit to expand its maintenance facilities to support expanding services in Central Contra Costa County, the Tri Cities area, as well as in Berkeley. Regardless of these maintenance needs, however, Berkeley's proposed service improvements will require more buses, new shelters, traffic and roadway improvements, and dispatch facilities for the special service for the handicapped. These capital costs amount to an estimated \$3,372,000 most of which is during the first several years as shown in Table 14.

Funding Programs

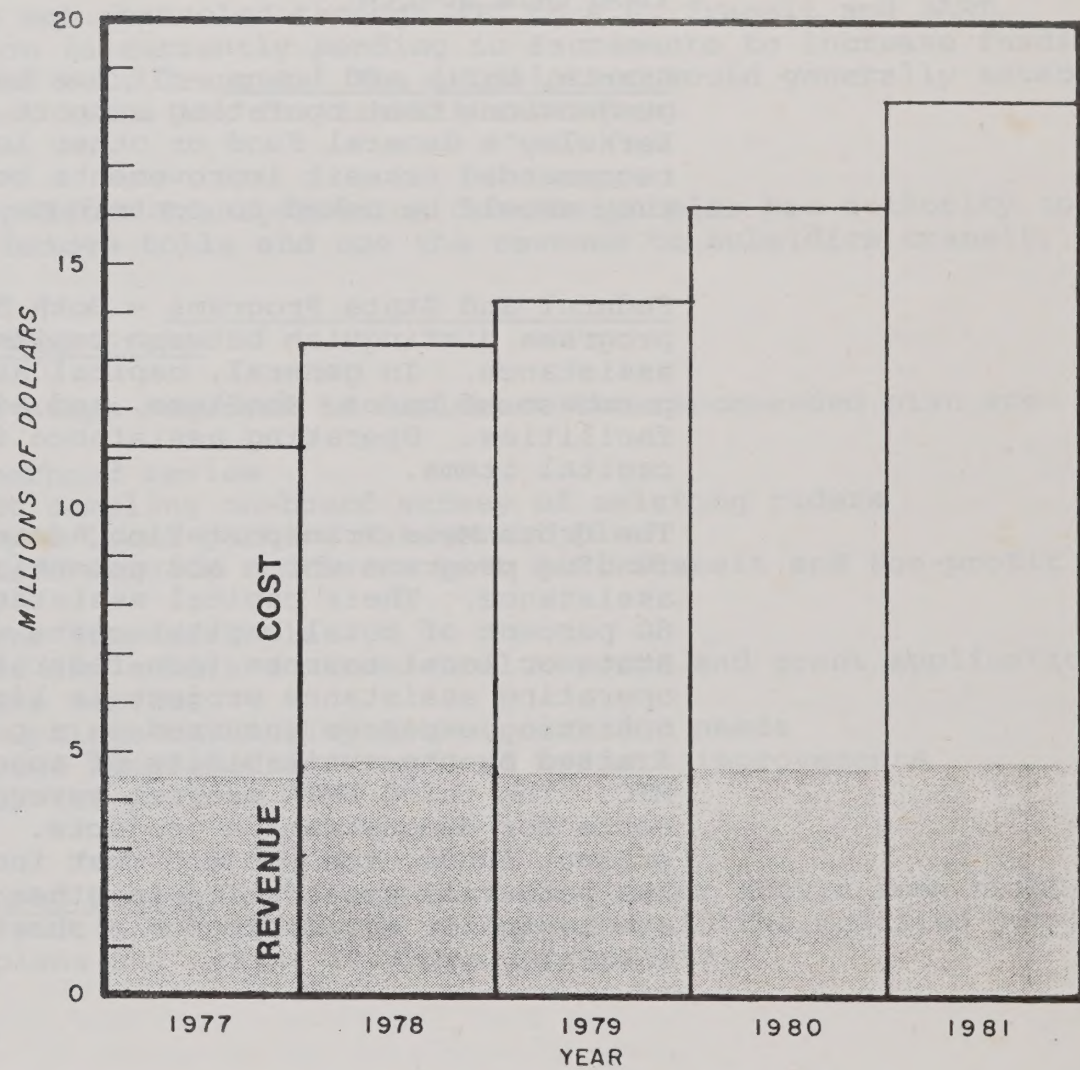
Capital expenditures and operating expenditures will be financed separately because each of these categories is eligible for funds from different sources. Although the final details of financing must be worked out with the various funding agencies, a plan is described here based on current legislation to finance the recommended plan. Figure 24 depicts the projected operating costs and financing for the next five years. Some of the basic financing alternatives are:

Property Tax - Although an advalorem tax on property and improvements could raise additional monies for transit, this is considered an unlikely source of revenue in that Berkeley already has one of the highest property tax rates in the Bay Area. A.C. Transit currently levies a property tax in Berkeley.

Sales and Use Tax - Sales and use tax is levied throughout the State of California. Since July 1, 1972, (SB 325), a sales and use tax of one fourth of one percent of all sales, including sales of gasoline, has been levied statewide and is placed in transportation funds for each of the State's 58 counties. These funds authorized by SB 325 are referred to as Transit Development Act

FIGURE 24

FIVE YEAR PROJECTED OPERATING REVENUE AND COST



(TDA) funds. TDA funds are now used by A.C. Transit and BART to subsidize the transit service they now provide Berkeley. BART and A.C. Transit's share of Bay Area TDA monies is determined by the Metropolitan Transportation Commission.

Parking Taxes and Fines - A detailed parking management study is needed to assess the social and economic impact of such a policy and to determine the amount of surcharge. No revenue is assumed from this source.

Grants, Gifts and Loans - It has been assumed in the revenue projections that operating support would be provided from Berkeley's General Fund or other local sources. Since the recommended transit improvements benefit other East Bay Communities they should be asked to contribute some of the operating cost.

Federal and State Programs - Both State and Federal transit funding programs distinguish between capital assistance and operating assistance. In general, capital assistance is limited to the purchase of buses, shelters, and administrative and maintenance facilities. Operating assistance is generally limited to non-capital items.

The Urban Mass Transportation Administration has three principal funding programs which are potential sources of financial assistance. Their capital assistance program covers up to 80 percent of total capital costs with the remainder coming from State or local sources (non-federal). The Federal share of an operating assistance project is limited to 50 percent of the operating expenses incurred on a public transportation system and limited by the availability of apportioned Section 5 monies to MTC. The third UMTA program covers up to 100 percent of the costs for demonstration projects. To qualify for demonstration project funds, the project must include a unique feature which has potential application in other cities. Demonstration funds are typically available for a short term period of no longer than several years.

The Federal Aid Highway Acts of 1973 authorized use of Highway Trust Fund monies for non-highway mass transit projects including purchase of buses. The amount of Federal Aid Urban (FAU) monies available for transit use depends on State and local apportionment decisions.

California State Bill 325, the Transportation Development Act, provides a source of capital and operating assistance. These funds currently are channeled through MTC to A.C. Transit and BART. Legislation is currently pending in Sacramento to increase funding of BART and A.C. Transit. The legislation would generally establish a permanent sales tax for transit subsidies.

The Metropolitan Transportation Commission also has authority to increase bridge tolls and use the revenue to subsidize transit.

Required Next Steps

The major steps required to implement the recommended plan are:

- Neighborhood review
- Conduct sampling on-board survey of existing riders
- Develop a local parking management plan
- Negotiate service contracts with A.C. Transit and Non-profit agency
- Finalize financial plan
- Prepare and submit environmental reports and grant applications
- Initiate service
- Study College-University Avenue corridor needs
- Encourage complementary regional transit improvements
- Monitor the program

Neighborhood Review - The transit coordinator should seek neighborhood reactions to both the recommended and the modified service plans and refine it where appropriate.

On-Board Survey - It is suggested that an abbreviated on-board survey be conducted on several key A.C. Transit lines to ascertain the impact of the proposed route changes on existing riders.

Parking Plan - The city needs a parking plan to complement its traffic and transit plans. Restrictive measures would generally benefit both the traffic and the transit plan but might destroy the economic viability of Berkeley's commercial centers and cause undue hardships on travelers who are dependent on the automobile for transportation. A study is, therefore, needed to develop an equitable plan which is supportive of the City's transportation and community goals.

Service Contracts - An infinite variety of contract arrangements are possible between the City and A.C. Transit and the non-profit agency selected to provide the special transit services. It is suggested that the city provide a flat vehicle hour of service subsidy to its contract operators plus fares collected for new service.

Finalize Financial Plan - Once the service contracts have been negotiated, the City will have a firm feel for the cost of the proposed improvement program. The City should then negotiate with MTC, Oakland, El Cerrito, Albany and Richmond to determine their willingness to participate in the local funding of the program.

Plan and Design Physical Improvements - Design plans should be prepared describing the physical elements of the Recommended Action Plan. Among the elements for which specifications are required are buses, shelters, dispatch center, the Hiller Drive turn-around, the Bancroft contra-flow bus lane, and the Shattuck Avenue bus lanes. CALTRANS already has plans prepared for the Grove Shafter-Warren Freeway interchange. The transit coordinator for the City should assign the responsibility for these design specifications to the appropriate parties. It should be his job to see that the plans are compatible with each other and with the other elements of the proposed action program.

Paperwork - Berkeley and A.C. Transit should prepare, distribute and initiate review and approval of environmental reports and grant applications. An environmental impact report described in the State Public Resources Code and an environmental impact statement described in the National Environmental Policy Act are required. Grant applications are also required for capital and operating assistance.

Initiate Service - Service changes must be smoothly initiated and must be preceded by plenty of public notice.

College-University Avenue - The high volume nature of this corridor may require special high capacity transit treatment such as available with light rail vehicle service. The demand in this corridor which extends south through Oakland along the Warren Freeway should be the subject of a detailed planning and feasibility study.

Regional Improvements - Berkeley's transit coordinator should encourage neighboring communities to upgrade their transit services and support strong automobile restraint measures. He should also advise MTC of Berkeley's desires regarding regional parking management policies.

Monitor Service - The implementation of the Neighborhood Traffic Study and the recommendations of this study should dramatically change travel characteristics in Berkeley. The recommendations of this study are best estimates of what is needed to serve the changing travel market in Berkeley in the years ahead. Patronage characteristics, transfer profiles and community attitudes however should be analyzed periodically to assure the recommendations are responsive to actual transit needs as they manifest themselves. A major assessment of the program is also suggested after four years along with the development of a plan for the succeeding five-year period.

appendix

A preliminary Draft Report was distributed to agencies represented on the Project Coordination Board, to facilitate their input to the study. Their comments to the preliminary Draft Report are included in their entirety, in chronological order in this appendix. Many of their comments were incorporated into this Draft Report, while some were not. Page numbers referenced are those of the preliminary Draft Report and, therefore, do not correlate with page numbers of this report. In general, the comments to the preliminary report were constructive and; thus, the report served its purpose. Some of the overall comments were:

- The University of California at Berkeley desired direct service to the Warren Freeway corridor, to the North Berkeley Hills and to the University Village. The Department of Public Works concurred with the University about the need for a direct Warren Freeway corridor-University of California transit route.
- A.C. Transit generally disagreed with the basic premise of a grid system, that riders would be willing to transfer if the transfer wait were short. The concept has been proven successful in Toronto, but has not been thoroughly tested in the United States.
- A.C. Transit feels that on-board ridership survey should be conducted prior to the testing of the grid concept in Berkeley in order to estimate the impact on existing patronage. In addition to the purpose A.C. Transit has identified, such a study would serve as a benchmark upon which to compare a post grid service survey. The comparison would provide useful information to other cities contemplating implementation of a grid service.

UNIVERSITY OF CALIFORNIA, BERKELEY

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SANTA BARBARA • SANTA CRUZ

OFFICE OF THE CHANCELLOR

BERKELEY, CALIFORNIA 94720

June 27, 1975

Berkeley Coordinated Transit Board
2030 Milvia
Berkeley, California

RE: UNIVERSITY OF CALIFORNIA, BERKELEY, RESPONSE TO DRAFT FINAL
BERKELEY COORDINATED TRANSIT STUDY

GENERAL STATEMENT

The University of California, Berkeley accepts the report drafted by Wilbur Smith and Associates and Curtis Associates, with the minor corrections as indicated below, as the final report of the Berkeley Coordinated Transit Study. Acceptance of the report does not imply complete agreement with all of the report recommendations as they relate to the University.

The University agrees in general with the objectives of better transit to serve the campus and the community and with reduction in the amount of traffic and parking on and around campus. University response to specific recommendations in the report, particularly in regard to parking allocation and parking charges, will not be available until the current study project of the Chancellor's Office on transportation and traffic is further along. Initial recommendations from the project should be available by the end of the year.

CORRECTIONS AND REVISIONS TO DRAFT FINAL REPORT

Chapter 4. University of California

Page 33. Employment Distribution

The reference to residential location of University employees is incorrect.

Page 35. Information in Table 6 is incorrect. A cursory analysis of the referenced Zip Code Sort data indicates that 57.6% of academic and administrative staff live in Berkeley and 36.7% of other staff, a combined total of 44.2% staff with Berkeley zip codes. This survey excluded student employees and covered 10,462 employees, including some part-time employees.

Page 36. The first line of the third paragraph might better read -
"The location of the University makes it difficult ----"

Chapter 5 Recommended Action Program

While the proposed routes are generally good and the proposed service schedules are excellent, some minor routing changes would better serve the city's largest destination, the campus. Route changes should include:

1. Direct service from the Warren Freeway corridor to campus as is recommended in Chapter 4.
2. Direct service from the Grizzly Peak, North Berkeley Hills area to campus.
3. Direct service from Claremont Blvd., south of Ashby Avenue, to campus.
4. Direct service from all lines serving Center Street BART station to campus West Gate and around West Crescent.

Page 54. Parking and Roadway Policies.

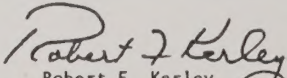
Some additions should be made to this section identifying transit streets other than Shattuck and Bancroft where the conflict between buses and cars in joint use of narrow rights-of-way will create congestion to the detriment of improved transit service. Existing transit service is already impaired in the most heavily used transit corridor, College Avenue, indicating need to remove parking on at least one side of the street to gain additional width for moving lanes and to reduce the conflicts created by parking movements of cars.

Additional existing or proposed transit streets to be considered for parking removal are: Euclid between Hearst and Ridge, Hearst between Oxford and Gayley, Piedmont between Dwight and Gayley. Parking prohibitions will expedite transit and be in keeping with the recommended policy to reduce the total amount of parking available, particularly near the campus.

Page 63. Financial and Implementation Program.

Financial figures for capital and operating costs and for revenue sources should be corrected and clarified.

The University has been pleased to participate in this project and will continue to coordinate its efforts to improve public transit access to the campus with the activities of the City of Berkeley in the implementation of the recommendations of this project report.


Robert F. Kerley
Vice Chancellor-Administration

UNIVERSITY OF CALIFORNIA, BERKELEY

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SANTA BARBARA • SANTA CRUZ

OFFICE OF THE CHANCELLOR

BERKELEY, CALIFORNIA 94720

April 1, 1976

Mr. Thomas F. Peak
Project Director
Berkeley Coordinated Transit Project
2030 Milvia Street
Berkeley, California 94704

Dear Tom:

At the March 12 meeting of the Berkeley Coordinated Transit Board I asked how the consultant's draft final report would utilize the comments of the various Board members. The response seemed to indicate that the comments would be included in an appendix but probably would not affect the report content itself. I note that this discussion was not reflected in the minutes of the meeting. As three of the members of the Board have substantial problems with either routings or the overall approach, it would seem important to consider the incorporation of some of these comments into the report which will be the basis for public hearings by the City.

Within the confines of the recommended overall grid proposal, I would particularly emphasize that proposed routings include direct access to campus from the Grizzley Peak, North Berkeley Hills areas and from the Warren Freeway Corridor. I discussed some specific routing changes in these areas with Peter Martin and with the Coordinated Board at the meeting of May 27, 1975. Mr. Kerley's letter of June 27, 1975 includes these two areas with others of less importance, plus suggestions for additions to parking and roadway changes to expedite transit.

I would also suggest that the Coordinated Board might discuss priorities for transit improvements which do not require major revisions in the current service patterns and which can be made with existing resources or limited resources.

Mr. Kerley will provide another formal University position when the amended draft is available.

Cordially,

A handwritten signature in cursive script, appearing to read "Dorothy Walker".

Dorothy Walker
Sr. Administrative Analyst

cc: Theodore H. Chenoweth
Robert F. Kerley

DW:lb

JUL 14 1975

CITY OF BERKELEY

JUL 8 1975

Memorandum

File: 3559

TO TOM PEAK, DIRECTOR OF COMP. PLANNING
FROM ROY OAKES, DIRECTOR OF PUBLIC WORKS
SUBJECT: BERKELEY COORDINATED TRANSIT
DEVELOPMENT PROJECT DRAFT REPORT

DATE July 8, 1975

We have reviewed the draft report prepared by Wilbur Smith and associates and have the following comments:

1. On pages 23, 36, and 42-43, a bus route is proposed (Rte. 37) to serve the Warren Freeway, Rockridge BART, Ashby Avenue and West Berkeley. It may be desirable to serve the Warren Freeway with a route directly to the U.C. Campus over Tunnel Road, Claremont Blvd., Belrose, Derby, Warring, Piedmont.

A survey conducted during the Neighborhood Traffic Study indicated that 50% of the traffic on Tunnel Road originated in the Warren Freeway corridor. Thus, a direct route to U.C. might serve to reduce vehicle-miles-travelled on these streets and has the potential to be a heavily used transit route.

2. On pages 28 and 52, a fares policy is discussed which suggests a lump sum contract for pass service. We believe that this and other non-capital programs should be pursued with or without the proposed new routes, and that such programs can increase transit ridership.

3. Pages 29 and 30 reference the Neighborhood Traffic Study recommendations. However, no specific recommendations are made in the Neighborhood Traffic Study Policy Analysis Report. A number of options are discussed and their impact on transit and automobile use are roughly analyzed.

4. On page 53, the proposed Woolsey-Benvenue bicycle route exists today on Woolsey and Hillegass as a signed bike route.

The Neighborhood Traffic Study also recommended completion of the pathway system as an important access to transit. This should also be noted, and pedestrian access should be emphasized as strongly as bicycle access.

5. On pages 54-55, bus lanes are discussed. It should be noted that the Bancroft bus lane is only suggested by the Policy Analysis Report and the Shattuck Avenue bus lanes are rejected. The Bancroft lane may be difficult to achieve because of demands for parking and loading on Bancroft. The Shattuck Avenue lanes would work very poorly without major reconstruction due to the need for access to the parking bays.

6. On page 55, the items under Tunnel Road do not seem to relate to transit improvement (except the fifth and seventh items) as much as to residential amenity.

CITY OF BERKELEY

Memorandum

File: 3559

TO TOM PEAK, DIRECTOR OF COMP. PLANNING

FROM ROY OAKES, DIRECTOR OF PUBLIC WORKS

SUBJECT: BERKELEY COORDINATED TRANSIT
DEVELOPMENT PROJECT DRAFT REPORT (cont.)

DATE July 8, 1975

7. On page 82, "Proposed transit improvements in the Warren Freeway corridor,..." Transit improvements could reduce College Avenue traffic, however the disconnect of Tunnel Road is projected to increase traffic on College Avenue and Claremont Avenue.

ROY E. OAKES
Director of Public Works

By: *John A. Gildea*
John A. Gildea
Assistant Traffic Engineer

JAG:bl

BERKELEY COORDINATED TRANSIT PROJECT

September 22, 1975

Mr. Thomas P. Peak, Project Director
Director of Planning
Berkeley, California

Dear Mr. Peak:

A. C. Transit has attempted to respond in this communication to observations, thoughts, criticisms from an operator's viewpoint regarding changes and impacts on an existing transit system. Our primary concern is to encourage transit usage by making meaningful improvements to an already functional transit system.

The consultants have identified a number of interesting findings regarding the characteristics of travel in and outside of Berkeley. Of the estimated 750,000 trips per day made by the people of Berkeley (Page 16 & Figure 5) 41.2% are local trips within the City of Berkeley, 44.4% of all the Berkeley trips are to or from places outside Berkeley & 14.4% of all the trips are through Berkeley. This information points up that there is a very definite need for various types of transit service, local as well as inter-city, to satisfy all those trips.

In our analysis of the Recommended Plan "1B", the above distribution of trips was foremost in our minds. Although the consultant's recommended plan is based on a premise that transit passengers are willing to transfer at least once to complete their trip, it is our experience that transfers tend to discourage patronage. It is true that close frequencies between transfer buses is desirable and would tend to minimize this disincentive, still transfers that can be avoided and yet keep the system on a modified grid pattern should also be considered. (Ref. Route #1 Comments in Attachment I).

The service operated in Berkeley has been designed with a grid pattern in mind, but over the years of transit usage and evolution, a semi-grid-radial system has emerged based on travel needs of the population. This fact points up that transit systems and transit routes are reflections of travel demands developed over the years. Changes contemplated in such an established system must be implemented in a controlled and slowly staged manner accounting for existing patronage and cognizant of disruptions in established travel patterns.

This is the position that A. C. Transit must take when modifications of the magnitude indicated in this Berkeley Coordinated Transit

Study are being considered. The attached analysis route by route reflects this concern of whether the change is for the sake of change or does it have a purpose and value to the existing as well as the potential transit passenger.

The recommended plan "LB" points up weaknesses in the present system as far as coverage is concerned such as West Berkeley's Industrial area and the Berkeley Hills area. Another observation that seems to be one of the key factors regardless of routings is the need and desire for more frequent bus service throughout the operating period. The proposed grid or the existing service routes can be materially improved by merely providing more frequent service. Transfers become less of a deterrent to transit demand if wait times at transfer points can be minimized. Again -- the key to this transit improvement is better frequency. This one factor alone is expected to encourage more patronage than any other change.

To summarize A. C. Transit's feelings on the Berkeley Study recommendations, we would like to suggest a possible course of action; the following is an approach that can be taken. In our detailed analysis of Proposal "LB: in Attachments I & II, it became clear that the consultant's work lacked consideration of the existing operating system and its passengers. A. C. Transit has a strong sense of responsibility to maintain the confidence of those passengers depending on public transit and must be continuously alert to not adversely affect those faithful users of the bus service. Therefore, any major disruptions in existing, long established service routes must be handled carefully and be thoroughly analyzed to insure that so-called improvements be improvements and not result in loss of present riders in the long run.

To improve the level of service in Berkeley, it may be beneficial to improve frequencies on the present lines to ten minutes to test the passenger potential. Better control can be exercised over determining whether the change in frequency would have any effect on increasing patronage. If route realignment appeared to be desirable as has been indicated by the consultant, then observation of actual inter-line transfers would indicate the necessity of this realignment. Realignment merely for the sake of creating a pure grid system lacks recognition of the passengers' needs and desires.

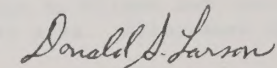
With changes in frequency, additional lines should be developed to fill in those areas that were identified by the consultant as poorly served. West Berkeley Industrial area, certain hill areas and corridors in North Berkeley are possible candidates for new lines to complete the modified grid that is already established in Berkeley.

The above controlled approach to bring about changes in the existing system seems to be a more manageable way to proceed and if the consultant's analysis of the grid system is correct, then the route patterns should evolve to something resembling Plan "1B".

From a relatively brief analysis of the consultant's financial projections, it appears that he is in the ball park regarding the difference in bus miles between the existing service for Berkeley and the Proposed Plan 1B - some 2,500,000 plus miles not including Special Needs Services or Humphrey Go Bart.

A more thorough financial analysis of the Recommended Plan will be forthcoming as soon as it can be made available.

Very truly yours,



Donald S. Larson
Senior Planning Coordinator

DSL:nc

ANALYSIS OF ROUTE PROPOSAL "1B"
REF. PAGES 39 to 46 INCLUSIVEROUTE 1A & 1B:

Benefit: A smaller vehicle opens up better access to Grizzly Peak Hill area and does tap some unserved areas of Cedar & Berkeley Industrial area.

Disbenefits: Does not tie into CBD, Center St. BART or U.C. Campus but would force users of this line to transfer to North-South Line in order to get to these major generators which are five to seven blocks off the Cedar Corridor. If Line 1 serves U.C. Village, then it seems only right that it tap U.C. Campus.

Suggestion: Line 1 along Cedar St. Corridor should be tied into CBD and Center St. BART Station in order to eliminate the necessity of a transfer. The value of the grid in this instance is outweighed by the elimination of what would appear to be unnecessary transferring.

ROUTE 7

Benefit: Provides direct service to the south campus area for passengers from the Euclid corridor. Provides an additional link to the Rockridge BART Station from the Claremont Hotel.

Disbenefits: Chops up Rt 65 for no apparent reason other than to create a grid pattern that may or may not be worthwhile and, as a result, eliminates a basic cross town grid line Rt. 65. This also eliminates the direct service from Ashby BART to the Claremont Hotel. Turn-around loop via Hillsdale creates a clearance problem because of the narrow street and parked cars.

Suggestion: Rt. 7 not take over function of Rt. 65 along Piedmont, Belrose, but that Rt. 65 continue as at present functioning as an already well established Grid Line on Dwight Way and Ashby. Parking would have to be removed from one side of Hillsdale to allow for adequate clearance if turn-around loop were to be used.

ROUTE 15

- Benefit: Improves North-South corridor service on Grove. Logical extension of the line to the north.
- Disbenefits: Line #15 utilizes 40' coaches and by extending this service over present Rt 67 would create a turning problem at The Alameda & Tacoma. The consultants have recognized this and re-routed this line via Solano to Colusa, however, Solano and Colusa is an uncontrolled intersection and would create some operational delays and hazards.
- Suggestion: Signalization or special treatment of the intersection at Solano & Colusa would be necessary.

LINE 40

- Benefits: Has very interesting Park & Ride feature attached to it at Golden Gate Fields Terminal. Provides new service on Gilman and into West Berkeley Industrial area. Eliminates layover downtown.
- Disbenefits: Would remove 43A from Solano Ave. Also Eunice St. between Shattuck & Walnut not acceptable for bus use due to narrowness of roadway for two-way traffic.
- Suggestions: Passengers on Rt 43A should be surveyed to determine their acceptance of this change in their travel pattern. Rose St might be used in place of Eunice St. between Spruce & Shattuck.

LINE 43

- Benefits: Improves the North-South alignment of the route and provides Arlington Avenue with direct service to Shattuck Ave. & Oakland.
- Disbenefits: Coach assignments on both Rt. 40 & 43 are large high capacity 40' buses which are not compatible with the configuration and space constraints of Arlington Ave. Line 7 presently operates this corridor and utilizes a 35' long 96" width bus which is still large in some locales of The Arlington. Albany riders should be surveyed before any change is made in Rt. 43-43A, eliminating direct service to CBD of Berkeley.
- Suggestions: Do not run 43 up Arlington, leave Rt. 7 as is.

LINE 51

Benefits:

Provides uniformity of Line 51 in Berkeley by making all trips follow Line 51 & 51M routing and eliminates 51A & 51C Legs.

Disbenefits:

Consultant suggests that Line 51 be divided in downtown Oakland splitting 51 Alameda & 51 Oakland/Berkeley into separate lines. This breaking up of the 51 Line is supposed to improve on-time service of the line but, in viewing the line, the College Avenue area is where lost time occurs, and improvements in that bottleneck would probably be the greatest help to improving scheduled on-time service. Another factor that must be considered which applies to the suggested split of the 40 line in downtown Oakland as well is the additional manpower and equipment needed to provide the overlap of the downtown Oakland terminals. Alameda passengers on Line 51 primarily travel to Grand Avenue, while Berkeley and North Oakland passengers on Line 51 should be carried at least to 7th St. and Broadway. Splitting the route can be a costly factor in the operating expense.

Suggestion:

By not considering dividing Line 51 in downtown Oakland and by maintaining the through carrier capability of the 51 between Alameda & Berkeley, we would maintain the same benefits the present line configuration affords passengers. Encourage support of the exclusive bus lane on College Ave. or at least some preferential treatment to allow transit vehicles to move more freely along that busy corridor. Travel time benefits as well as operating cost savings can be realized with faster transit travel time.

LINE 65

See comments for Line 17

Benefits:

Provides service to Gayley Rd & So. Campus from Dwight Way area.

Disbenefits:

Breaking up Line 65 into several sections seems to have little benefit, if any at all. Line 65 is primarily an East-West Grid Line on Dwight Way & Ashby. The section of Line 65 on San Pablo between Ashby and The North Berkeley BART Station was intended to provide direct BART service to passengers along San Pablo who did not have access to BART other than via Line 72 to downtown Oakland.

LINE 65 (CONT.)

Suggestion:

Improving the frequency of present Line 65 would appear to have a positive effect on transit usage in that area much as is suggested by the grid changes that are proposed in "1B".

LINE 67

Benefits:

Ties Alcatraz Avenue into U.C. & downtown Berkeley directly.

Disbenefits:

No obvious disbenefits other than disrupting any present passenger trips between Spruce & Colusa corridors.

Suggestion:

Before this change is made, existing passengers should be surveyed to determine if any through riders would be adversely affected and would be willing to transfer to make this trip.

LINE 72

No Comments

LINE 88

Benefits:

Provides a logical North-South Line extension beyond its terminal at North Berkeley BART Station.

Disbenefits:

As a result of this North-South Line extension, direct Line 43 service to downtown Berkeley is eliminated.

Suggestions:

Before the Line 43 would be changed to the suggested alignment, existing passengers should be surveyed to determine if they would be willing to transfer rather than have direct service to downtown Berkeley.

LINE 37

Benefits:

Meets a need to provide West Berkeley Industrial area access to BART and Berkeley proper.

Disbenefits:

The whole orientation of Line 37 under the proposed plan is incorrect. The primary purpose of Line 37 was to provide as direct as possible service to Montclair and Merritt College from Berkeley C.B.D. & Ashby, Adeline University Ave. Corridors. Line 37 also provides reverse direction service from Montclair to U.C. Campus.

LINE 37 CONT.

Disbenefits:
(cont)

Preferred plan also eliminates direct service to downtown Berkeley from the Tunnel Road Corridor.

Suggestion:

Line 37 orientation should stay as is. With the suggested increased frequency and extended hours of service, Line 37 could develop into a major trunk line. The re-route of Line 37 via Warren Freeway to Rockridge BART Station needs more consideration as to its appropriateness. With the necessity of Cal-Trans completing the Hwy 24/Landvale Interchange it may be premature to plan such a routing change in a five (5) year plan.

TRANSBAY SERVICE:

The proposed plan "1B" suggests tailoring down of Transbay Services immediately upon BART's Richmond-Daly City Line becoming a reliable operation. A.C. Transit's policy on this transbay subject is based on phasing down as warranted reflecting reduction in passenger demand. Immediate curtailment or abandonment would not be an acceptable approach given the present policy. However, it is agreed that with BART's Richmond-Daly City link in full, reliable operation that the Transbay lines that parallel BART's line will be heavily impacted and ultimately the Transbay Service may approach the level of service described in Plan "1B".

Line E:

Extended to Hiller Drive area has been considered for some time and appears a practical extension of the E-Local at least in the commute hours.

Line F:

The severity of the cutback on Line F as planned in "1B" definitely will not occur at any one point in time. BART performance and passenger usage will dictate the timing of Line F's reduction and will most likely occur over a long period of time. Another concern would be the elimination of Line 43A & F on Solano Ave. Residents of Albany and The Thousand Oaks neighborhood would not have the benefit of direct service to the C.B.D. & U.C. Campus.

TRANSBAY SERVICE:
(Cont.)

Line G:

Again, demand will dictate action to be taken on this route.

Line H:

It is suggested to cancel Line H at the outset of Implementation of Plan "1B". Again, this is primarily dependent upon passenger demand.

Lines 17 & 33:

Are suggested to be discontinued based on the Plan "1B" Proposal. In the case of Line 17, depending on the changes that might be made, Line 17 may be phased out if replaced adequately by another line extension. However, most of Line 17 is outside of Berkeley's city limits and raises a question of whether it is proper for a Berkeley Planning Group to be suggesting changes in services that are not primarily used by Berkeley residents and whose users have not been adequately represented on the Berkeley Citizens Advising Committee.

Line 33:

Is, of course, one route that was planned to be abandoned with the opening of the BART Richmond-Fremont line. Because of strong public pressure, the Line 33 is still operating. The same policy as stated for the Transbay Service applies to Line 33. It is envisioned that Line 33 will eventually be tailored down to a point where it no longer will be feasible to operate and abandonment will occur. But, this again, like Transbay Services, will not happen overnight. Plan "1B" is too abrupt in this sensitive area of service abandonment.

COMMENTS ON DIFFERENT POINTS IN TEXT OF REPORT

- Page IV Shelters: What about shelters that are being installed
Page 50 by A.C. Transit as a district wide program?
- Page 9 Disabled People: The report indicates approximately
12,000 disabled persons in Berkeley, but
neglects to go into the types of disabilities
that make up that 10% of the population of
Berkeley. Non-ambulatory and ambulatory data
seems to be necessary to determine magnitude
of transit service needed.
- Page 29 Bicycle Racks: Are not proven and need more evaluation
before A.C. Transit would consider use of
them.
- Page 37 Recognizes need for transit access into the U.C. Campus.
- Page 51 Maintenance Facility: With any major expansion as indi-
cated in proposal maintenance and parking of
buses is a problem. Present Division #2 is
at capacity. AC Transit has consultant study
in preparation.
- Page 52 Fare Policy: Zone Fare Structure has been eliminated as of
7/1/75.
- Transit Pass is being experimented with in
Hayward area in a couple of months demonstra-
tion of usage.
- Honor System has very definite operational
and promotional benefits but appears to be
a ways off for American Transit Systems.
- Page 54. Bus Lanes: Support concept of exclusive bus lanes as
indicated in the report but would also
support an improvement on College Ave
corridor by removing parking from one side
of College Ave. north of Ashby and providing
for preferential treatment of buses on that
corridor. This would be a definite improve-
ment in transit travel time on that corridor.

Page 55

Tunnel Road: The closure of Tunnel Road as recommended by the Berkeley Neighborhood Traffic Study would prevent Line 37 from its very direct routing to the City of Berkeley from Montclair and Merritt College. Also Tunnel Road/Landvale Road would not have direct service to downtown Berkeley, a minor trip generator but still to be considered since Line 37 now provides that access. As was commented on Line 37 re-route proposal in Plan "1B". The recommendation is based on Cal Trans completing the Warren Freeway/Grove Shafter Interchange to allow for free flow between the two freeways. This condition and the concern that has already been expressed on the appropriateness of Line 37 being routed to Rockridge BART bring us to the position that Line 37 should stay as is and be upgraded in frequency and hours of service.

Page 62-63

Local Control: It does not seem appropriate for A.C. Transit Board Members to sit on a T.A.C. It would seem more appropriate that A.C. Transit management personnel be the representative on such a technical committee. The same comments may apply to the proposed citizens committee representation.

Page 63

Last Paragraph: The assumption that operating revenue is approximately 55% of A.C. Transit's operating cost may be overstated slightly. Currently, the revenue to operating cost ratio system-wide is approximately 31% with costs escalating at say 7% per year. The revenue/cost ratio will most likely become smaller even though patronage increases.

Page 67

Last Paragraph: The statement that the user cost per mile of BART service is 6¢ and the user cost for a one mile bus trip is 25¢ is very misleading since one system is based on graduating fare cost per mile of travel (BART) while the other is based on a flat 25¢ fare locally. BART's fare should be stated at 30¢ - their minimum fare. If this is the case, then the argument does not make sense.

- Page 70 Service Contracts: The statement that..."Berkeley is paying for more than it is receiving..." is not necessarily true and should not be assumed to be a fact. Depending on the way of allocating costs and benefits in our analysis A.C. Transit is providing (dollar-wise) services and values that are equivalent to dollars invested as best we can determine for A.C. Transit.
- Page 70 Plan and Design Physical Improvements: Preferential bus treatment on College Ave. and removed parking on at least one side of the street north of Ashby is an element that should be considered. This is very important to A.C. Transit, and should be important to the people of Berkeley.
- Page 77 Proposal #3 was designed to upgrade the existing system, however, a number of routing modifications were considered and frequencies were set at 10 to 15 minutes producing some longer travel times than Plan "1B", which was based on 10 minute frequencies or less. If the existing routes were operated at 10 minute frequencies and certain identified unserved areas were served, then I would venture to say that this system could do as good if not better in providing transit as Proposal "1B". It appears that the existing system was not evaluated on the same basis as the other proposal.
- Page 81 Table 13: Should be re-worded reflecting corrected T.D.A. figures as per revised Table 9. Also, some explanation of the existing transit service value should be allocated between A.C. Transit and Humphrey-go-BART. An explanation of how the base figure was arrived at and what factors (cost, per mile, etc.,) were used.

BERKELEY COORDINATED TRANSIT PROJECT

October 31, 1975

Mr. Thomas F. Peak, Project Director
Director of Planning
Berkeley, California

Dear Mr. Peak:

As a follow up of our letter and comments on the "Berkeley Coordinated Transit Project" draft report, the following is a brief analysis of the financial implications and assumptions that have been developed by the consultant.

In our analysis of the financial projections for the plan, we were able to identify that the incremental difference between the present system operation, and what is proposed, represents approximately 2.2 million miles of additional service at the end of five years (1980). This mileage estimate is very near what the consultant estimated, 2.33 million miles in 1980 within Berkeley.

However, even though the incremental mileage is very close in comparison, Table 9 will need some more discussion as to the accuracy of the estimates. One observation is that the consultant, in his analysis of the present system, indicates that there are 2.33 million miles per year operated presently by AC Transit within Berkeley. In our analysis we find that (including transbay service) there are approximately 3.06 million miles annually operated for Berkeley although our basis for determining miles in Berkeley is very rough since we do not maintain line miles by city.

The reason for the concern about the transbay mileage is the consultant's assumption that in the next five years BART service will become more reliable to the point that AC Transit would curtail a major portion of its transbay lines. This could happen but there is just as strong a chance that BART may not be able to direct more passengers than it is at present. This is mentioned as a caution that if transbay services aren't able to be curtailed to the extent envisioned by the consultant then Berkeley's annual mileage figure may be raised by that increment, thus raising the annual operating costs and as a result increasing the additional subsidy needed to maintain the proposed system. This concern is raised to identify a reality that an increase in annual miles may have to be accounted for depending on the unknown condition of the BART service level in the next five years.

Farebox revenue per mile in 1980, using the consultant's estimate of 4.66 million miles plus 216,000 miles for special service to schools* in Berkeley equals 4.93 million miles divided into \$5.39 million in farebox receipts, equates to \$1.21 per mile of service. Presently, Line 51/58 averages 84¢ per mile, so by 1980 our highest paying local line would have to increase its revenue per mile productivity by 44%. This seems very optimistic, especially since the revenue per mile for local lines that operate through Berkeley is approximately 60¢ per mile on the average. This means that, on the average, all Berkeley lines will have to increase their productivity per mile by 100+%. Or another way of stating it is that for every mile of operation within Berkeley where there are three passengers on the bus, there will have to be six passengers (assume 22¢ average fare), a 100% increase in riders. This seems on the high side in our estimation, in viewing the present system productivity. Although a very desirable objection, as far as for planning purposes maybe this revenue should be estimated closer to 80¢ per mile ratio, or, \$3.90 million in farebox revenue for 1980.

The consultant's methodology in deriving operating costs seems to be a fairly acceptable approach. Assuming the estimated miles and manpower are accurate, which appears to be in the ball park, then the cost estimates for the proposed system are reasonable. The consultant inflated costs and tax revenues by a factor of 7% per year for the five year projection. AC Transit has been using 8% in recent estimates but 7% might be as accurate as 8% since this is based on a prediction of future variation in our economy and that could be anyone's guess.

Property tax estimates, assuming the assessed valuations are correct for Berkeley, may be a bit overstated. The consultant used 46.8¢ per \$100 of assessed value to arrive at the revenue generated from taxes collected by AC Transit from Berkeley. However, the current rate is 47.7¢ per \$100 of assessed value. This rate is not all usable for operations. About 3.6¢ per \$100 is committed to bond debt and interest of AC Transit District. Therefore, the net rate of 44.1¢ per \$100 of assessed value is actually available annually for operation purposes. Another factor that should be accounted for is the County's charge of ¼% annually as a collection fee which should also be deducted from the total tax revenue. Again, if the estimate of the assessed value is correct, less any redevelopment agency properties which are exempt, then by applying the proper tax rate the estimated revenue can be determined fairly accurately.

The T.D.A. funds as identified by the consultant were \$312,900 in 1976. The consultant was not able to tell us where this number came from but by checking with M.T.C. the amount, in their opinion, seems reasonable. However, the consultant assumed in 1976 that only 25% of the T.D.A. funds could be used for operating purposes. We feel this is an incorrect assumption and that a much higher percentage is usable. The T.D.A. items of this five year plan should be checked out with M.T.C. to see if the consultant's assumption is, in effect, incorrect.

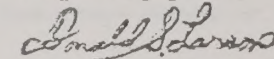
* AC Transit's estimation

One item that seems to be missing in Table 9 is the Capital Funding Program and where the local matching funds would be coming from. It appears that there is not enough T.D.A. money available to cover the local match for the estimated \$2.4 million UMTA Capital Grant. This definitely needs to be explored as to how the capital program is to be funded. Also, the estimate of \$60,000 per bus in 1976 to arrive at the \$2.4 million figure for capital expenditures may be on the low side. Current bus bids indicate that transit vehicles are costing \$70,000 to \$75,000 per copy.

UMTA Federal operating assistance money is a fairly new program and has not been tested long enough in the urbanized area to know what assurance can be placed on the amount the consultant has identified. M.T.C. (formula agreed to by operators) allocates S-336 funds to transit operators in the San Francisco urbanized area. There is a great need and great competition for these funds, therefore, they should be considered with caution when planning five years into the future. BART recently through state legislation can receive Federal operating monies which will undoubtedly reduce AC Transit's share of the fixed amount of dollars available from that six year program. No one has a handle as to how to plan for these funds in the immediate future. They must be recognized, but also viewed with caution and somewhat with uncertainty as a source of permanent revenue.

In summation, what we are trying to say is that \$3,000,000 (Table 9) of additional Berkeley subsidy in 1980 may be sufficient, but that figure could be as much as \$5,000,000 if farebox revenue was 80¢ per mile, Federal operation monies were reduced by a certain amount and T.D.A. funds increased at a 7% inflated factor annually based on the 1976 estimated amount.

Very truly yours,



Donald S. Larson
Senior Planning Coordinator

DSL:co



BAY AREA RAPID TRANSIT DISTRICT
800 Madison Street
Oakland, California 94607
Telephone 465-4100

OCT 15 1975

October 13, 1975

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PRESIDENT

ELMER B. COOPER
VICE PRESIDENT

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GENERAL MANAGER

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6TH DISTRICT

ELLA HILL HUTCH
7TH DISTRICT

ELMER B. COOPER
8TH DISTRICT

JOHN H. KIRKWOOD
9TH DISTRICT

Mr. Thomas Peak
Project Director
Berkeley Coordinated Transit
Development Project
City Hall
Berkeley, California

Dear Tom:

Due to an assortment of reasons, our comments on the Transit Development Project have been in limbo for some time. I suspect many of our comments have already been raised by others and dealt with. In any event, attached are a series of observations, some minor others more substantive, on the draft report.

One major comment concerns initiation of direct San Francisco service. The report on Page 44 assumes direct service this year. This obviously will not be the case and some uncertainty exists about when that service can be started. For the purposes of the report, perhaps it is most appropriate to tie certain recommendations to start of direct San Francisco service without a specific reference to date.

Lastly, as I stated in the last Board of Control meeting, I am concerned with the implied conclusion of the consultant report that better service requires additional resources; or put another way, that the existing services are operating in the most effective manner given the current dollar commitment. From discussions at Board of Control meetings, there does not seem to be any support for this conclusion, yet without a "baseline" analysis, we will never know. More importantly, however, I do not believe a case can be made, or supported by the community, for the investment of more resources without knowing what the additional commitment buys, and this cannot be done with the information developed so far.

Sincerely,

W. F. Hein
Director of Planning

WFH:kb
Attachment

p. 16 TRAVEL CHARACTERISTICS

- Total weekday trips shown in Figure 5 probably should be 770,000 rather than 77,000
- Through trips should be divided between those on the freeway and those on City streets
- The extent to which local trips are made by walking should be included
- Transit penetration of various markets could be better shown to indicate the more productive areas for transit efforts.

<u>Travel</u>	<u># Trips</u>	<u># On Transit</u>	<u>% Transit</u>
Local	316,000 ¹		10
Into	176,000	17,600	10
From	166,000	41,500	25
Through	111,000 ²		

1. Should have walk trips subtracted.
2. Should have freeway trips subtracted.

p. 22 POTENTIALS FOR IMPROVEMENTS

- Travel within and to Berkeley are discussed, however travel from Berkeley is not
- Table 3 appears incomplete and is difficult to use. There should be some better way to demonstrate how uncompetitive transit is for local trips. Expected travel time might be a better way to present it
- Figure 13 (following p. 31) seems to have a curve missing for trips into Berkeley.

p. 32 ACTIVITY CHARACTERISTICS

- While substantial information is available for the campus, comparable information should be provided for other major attractors, particularly the industrial area.

p. 38 RECOMMENDED ACTION PROGRAM

- The connection between better local transit service and automobile congestion on City arterial streets is not well made.
- The recommended plan uses the congested arterial streets, however makes only one specific suggestion (special bus lane in south campus) on how bus flows can be given preference over autos.

P. 53 BICYCLE STORAGE

-BART is proceeding with plans to add bicycle racks and lockers at most stations on the system. Current plans call for the following numbers in Berkeley:

	<u>New Racks</u>	<u>Lockers</u>
North Berkeley	62	16
Ashby	52	12

p. 55 TUNNEL ROAD

-The discussion of traffic control elements seems largely unrelated to transit service in the Warren corridor

-Route 37 does not extend beyond the Montclair area yet Figure 6 suggests many trips to Berkeley are coming from further south

-Rerouting the 37 bus into Rockridge BART would have several benefits not highlighted

- a. good feeder service to BART for Montclair residents
- b. additional bus capacity in the College Ave. corridor between BART and U.C.

p. 63 FINANCIAL AND IMPLEMENTATION PLAN

-Figure 19 and Table 9 are confusing and perhaps misleading. The relationship between existing resource commitments and new costs should be presented much more clearly.

-Table 9 lists various subsidies as "revenue". This is somewhat confusing since revenue is generally only associated with fares and advertising or charter income. "Income" would be a better word choice.

p.67 SALES AND USE TAX

-Apparently the recommendation here is that BART get less TDA monies from Berkeley. If this is to be proposed it should be supported by more than one paragraph of analysis.

p.68 OTHER TAXES AND RATES

-While it is generally accepted that parking costs have an important impact on mode choice, the effect is also sharply selective for various types of trips. The report fails to consider the magnitude and character of the impact of parking charges on transit. No distinction is made between short term and all day parking.

p. 70 SERVICE CONTRACTS

-The statement that Berkeley pays for more than it receives should either be documented or dropped.

p.79 PATRONAGE

-Throughout the report (p.vii, p.38, p.82) there is confusion about an increase of 3 or 3-5 times and whether this increase applies to just local transit trips or includes travel to and from Berkeley

p.82 COMMUNITY-ENVIRONMENTAL IMPACT

-The relationship between the transit plan and traffic volumes is never documented.

p. 63 FINANCIAL AND IMPLEMENTATION PLAN

-_Figure 19, Fare box revenues in Figure 19 do not make up 55% as stated on p. 63 and suggested on p. 67.

p. 67 SALES AND USE TAX

-Last paragraph. Cost seems to be equated with fares and consequently this section is confusing. The average BART fare is about \$0.62 and average trip length 11 miles.

Wilbur Smith and Associates
1000 Wilbur Smith
Berkeley, California 94704

Mr. Thomas Hall
Project Director
Berkeley Coordinated Transit Project
400 Alameda Street
Berkeley, California

During the course of the Berkeley Coordinated Transit Project, the transportation design and engineering team, consisting of Wilbur Smith and Associates, Inc. and Curtis Associates, Inc., has been responsible for the design and development of the project. The design team has been responsible for the design and development of the project, including the design of the transit system, the design of the transit facilities, and the design of the transit services. The design team has been responsible for the design and development of the project, including the design of the transit system, the design of the transit facilities, and the design of the transit services.

The subject of this report is the design and development of the Berkeley Coordinated Transit Project. The report is divided into two parts: Part I, which describes the project, and Part II, which describes the design and development of the project.

Respectfully submitted,

berkeley coordinated transit development project **appendix**

Wilbur Smith & Associates
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March 29, 1976

Mr. Thomas Peak
Project Director
Berkeley Coordinated Transit Project
2030 Milvia Street
Berkeley, California

Dear Mr. Peak;

We are pleased to submit six appendix documents prepared during the course of the Berkeley Coordinated Development Transit Project. The appendices describing Berkeley's socio-economic characteristics, and existing transit service in Berkeley were both prepared during the summer of 1974. They have been updated as much as possible to reflect recent transit changes, without disturbing the consistency of the data which was employed to develop the recommended transit improvement program.

The salient transit changes, in general, included increased BART fares, increased BART service hours and increased Humphrey Go BART and Center for Independent Living transit services.

Respectfully submitted,

Wilbur Smith & Associates

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APPENDIX F - REFERENCES

APPENDIX A

PROJECT DESIGN

In the 1960's several transportation studies proposed arterial street widenings and extension of the Bay Area freeway system in Berkeley. Strong community opposition to these proposals led to adoption of a Master Plan policy that, in effect, committed Berkeley to seeking alternatives to automobile travel. The recently completed Neighborhood Traffic Study was designed to lay the ground work for general overall traffic reduction in Berkeley. In order to accomplish these objectives without an overall loss of mobility to travelers, an attractive alternative means of transportation was needed. The generally good public transportation system serving Berkeley thus, needed an overhaul to attract a greater proportion of off-peak local travel (non-work) and a greater proportion of trips attracted into Berkeley.

Project Purpose

The purpose of this project was to define an action program for improved community transit within the City of Berkeley and better coordinated transit service between Berkeley and elsewhere in the Bay Region in order to attract and serve many more trips.

Project Organization

The Project was under the direction of the Berkeley Transit Coordination Board. The Board was composed of representatives of the City of Berkeley, the Berkeley Unified School District, the Metropolitan Transportation Commission (MTC), BART, AC Transit and U.C. Berkeley.

Mr. Thomas Peak, Director of the Berkeley City Planning Department, administered the Project for the Board. A committee of Berkeley citizens and a technical committee advised the Project.

Technical Services

The consulting firm of Wilbur Smith and Associates was employed to conduct the technical study work. Curtis Associates was subcontracted by Wilbur Smith and Associates to conduct the community involvement activities of the study and provide general support functions. Douglas Spaeth was similarly subcontracted to provide technical services, coordinate production of the final report and develop patronage estimates. The City of Berkeley contributed a full-time transit planner to work with the consultant staff.

Logistics - A project office was established at 2030 Milvia Street in Berkeley to better coordinate consultant services, local in kind services and encourage citizen involvement. The staff of the City's Master Plan Revision effort was located in the same office to jointly benefit both planning activities.

Community Involvement - The Berkeley community was invited to contribute to the study through; the Citizen Advisory Committee, neighborhood meetings, and attitude questionnaires. In addition, comments were solicited at the Berkeley Transit Fair and throughout the course of the project at the Project Office. All project meetings were open to the general public.

Work Program

The work program was comprised of 11 tasks as shown in Figure A-1. It was designed to facilitate the development and evaluation of different service concepts in lieu of an approach intended to fine tune and adjust AC Transit's existing service. As such, a considerable amount of energy was devoted to the development of diverse and responsive alternative concepts.

FIGURE A-1

BERKELEY COORDINATED TRANSIT DEVELOPMENT PROJECT
TASK AND SUBTASK DESCRIPTION

1.0 DEVELOP OVERALL WORK PROGRAM

1. Define consultant's schedules
2. Define creditable services
3. Define involvement of others
4. Prepare working memorandum

2.0 REVIEW WORK PROGRAM

1. Review program with project participants
2. Review program if required

3.0 COLLECT DATA

1. Collect data, studies, plans
2. Identify existing & planned land uses
3. Identify and describe major activity generators
4. Collect and summarize existing travel data
5. Collect and summarize new data
6. Inventory existing transit systems
7. Identify special user group needs
8. Elicit user group attitudes
9. Identify and evaluate non-transit program aspects
10. Conduct community group/agency meetings

4.0 DEFINE ONGOING INFORMATION PROCESS

1. Analyze data and identify needs
2. Prepare information base for review
3. Review findings with interest groups
4. Correlate community/agency feedback

5.0 DEVELOP EVALUATION CRITERIA

1. Review goals and objectives
2. Review standards, plans and policies
3. Review air quality standard and E.I.S.
4. Identify community attitudes
5. Prepare evaluation criteria report

6.0 DEFINE ACTION PROGRAM ALTERNATIVES

1. Prepare and describe 3 concept programs
2. Prepare working memorandum

7.0 REVIEW CRITERIA/CONCEPT ACTION PROGRAM & ALTS.

1. Work with community agencies
2. Report on community feedback

8.0 REFINE ACTION PROGRAM ALTERNATIVES

1. Describe proposed transit services
2. Describe vehicle/operating requirements
3. Relate existing/proposed service characteristics
4. Relate existing/proposed service to user groups
5. Delineate support facility requirements
6. Prepare illustrative 5-year operating plans
7. Describe non-transit actions
8. Assess community/service impacts of alternatives
9. List additional program parameters

9.0 COMMUNICATION/EVALUATION PROCESS

1. Prepare evaluation information
2. Conduct citizen participation program
3. Report results of transportation value game
4. Define use of media
5. Organize and report feedback
6. Prepare an evaluation memorandum

10.0 TEST PROGRAM ELEMENTS

1. Assess feasibility of program elements
2. Examine test program elements
3. Recommend/describe single action program

11.0 FINAL REPORT

1. Prepare draft report and review with Board etc.
2. Revise draft and review w/Board etc.
3. Prepare and publish final report

Study Organization - The first two elements of the work program were intended to provide an understanding among the study participants regarding eachs respective responsibilities. The establishment of communications between participants was also accomplished.

Data Collection - The Project inventoried and analyzed existing and planned conditions in Berkeley in greater detail than is typically done on similar studies. A detailed map inventory of theaters, churches, child care facilities, etcetera, was prepared to assist in the development and evaluation of a community transit service designed to serve all trip purposes not primarily work trips. Additionally, existing trip tables were transposed from traffic zones into corridor transit zones to facilitate the estimation of patronage. The inventory of existing transit service not only included AC Transit, BART and the BUSD but it also included taxis, U.C. Berkeley Transit services, and special services to the disabled.

Data Analysis - The fourth and fifth elements of the work program compared the data availability versus data needs. Some data such as the local trip table had to be transposed to a zone system more suitable for the evaluation of transit routes. New data such as the residential distribution of U.C. Berkeley employees was developed. Evaluation criteria were then developed to use this data to measure the benefits and costs of alternative transit concepts.

Alternative Concepts - Three alternative concepts were developed in task 6 for evaluation. Later, in tasks 7 and 8, a fourth alternative was added to the evaluation process. Each concept was evaluated according to its ridership convenience, patronage potential, costs, community and environment impacts and its overall operational and institutional feasibility. Citizen reaction was sought through several neighborhood workshop presentations, open house during the Berkeley Transit Fair and

through wide distribution of the report "These Proposals for Improving Public Transportation in Berkeley" prepared by the City of Berkeley Planning Department.

Evaluation of Alternatives - Community input to the evaluation of alternatives was both on a day to day continuous basis and on set times during presentations to neighborhood groups. A consensus choice of local groups, the project Board and citizen's and technical advisory committees was achieved during task 9 with test alternative 1B, the grid service alternative.

Recommended Plan - Based upon the selected grid service approach, the study team refined an efficient workable plan in task 10, which recognized vehicle requirements in the North Berkeley Hills, improved access to BART and was consistent with the City's major thoroughfare plan.

Report - Task 11 entailed the preparation of a report satisfying UMTA grant requirements of which this appendix is a support document.

APPENDIX B

SOCIO-ECONOMIC CHARACTERISTICS OF BERKELEY

Berkeley is a diverse city in terms of population, lifestyles and economic and racial mix. It is a progressive city whose leadership has often led other cities in adopting and implementing innovative people-oriented programs and city-wide programs to solve problems. This can probably be traced to the generally high education level of its residents, the University of California and Berkeley UC students who consist of approximately 17% of the residents of Berkeley.

A number of Berkeley residents fall into the high transit-need category. Among the high transit-need groups are a significant number of University of California students without autos, those too young to drive, the elderly, autoless households, the poor and disabled. All parts of the city contain a number of residents who fall into these categories of high transit-need.

Though there are seven commercial districts in the city and an abundance of industry in the West Berkeley area between San Pablo Avenue and the freeway, Berkeley, as a whole, is a residential town with the University of California and its associated activities being the most dominant influence. The neighborhoods are distinguished by housing density, style, topography, and type of residents rather than by the use of the area for commerce or industry.

Population

The 1970 Census reported the population of Berkeley as 116,716 persons. A recent 1973 California Department of Finance report indicated no significant change in population since the 1969 Census tabulation. About 44% of the residents are in the 18-34 year age bracket with 20% being 18 years of age or less and 13%, 62 years of age or older.

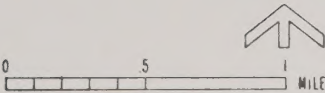
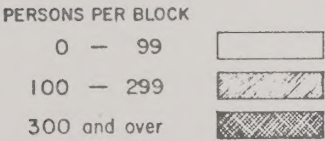
Demographic Characteristics - Exclusive of the student population, Berkeley exhibits many of the population characteristics of core cities; the White population is generally older than the non-White population and is a majority of the total population. However, below the age of 20, the White population is a minority population. Almost 1 out of 5 of the White non-student population is over 65 years of age and about 1 out of 10 is over 75 years of age. This high percentage of the elderly has a direct bearing on the type of public transportation needed to cope with Berkeley's internal transportation needs. The total White population of Berkeley, including students of UC, shows a heavy concentration of residents in the 20-30 year age group--almost 30% as against a statewide average of 12%.

The Black population of Berkeley, the largest minority, is roughly equivalent to the White population in size in the early age groups and is largely unaffected by the presence of UC students. Relatively few of the students at UC are Black. Berkeley's Black population, when compared with the Black population of other cities in the area, has higher incomes, lower family size and is better educated.

Berkeley's education level is one of the highest for cities in California; 77% of the residents have completed four years of high school and 40% have finished four years of college.

Residential Distribution - The residential areas have an average density of 39 persons per acre. Figure B-1 shows the ranges of residential density that exist in Berkeley. Generally, higher income residents are in the hill areas, the student population is concentrated around the University and the non-White and poorer residents live in the flatlands. The elderly are dispersed throughout the city with over one-half of the census tracts containing 15% or more residents 60 years of age or over. Estimates have indicated that the disabled population of Berkeley numbers approximately 12,000 (Table B-1) and are scattered in various sections of the city. University of California students reside in all sections of the city; however, over one-half of the Berkeley UC students are

FIGURE B-1
NEIGHBORHOOD
POPULATION
DISTRIBUTION



clustered in an area bounded by Spruce, Fulton, Ashby and Dwight Way.

Table B-1
DISABLE BERKELEY RESIDENTS

<u>SOURCE</u>	<u>PERSONS</u>
1970 Census (Age 18-64)	13,734
Social Security Administration	12,442
Ridge Form	5,434

Income Characteristics - The average income of Berkeley families was reported as \$7,341 by the 1970 Census with the median income being higher, \$9,983 per year. The median for White families was \$11,118 and for Black families the median yearly income was \$7,995. Almost 25% of the families and unrelated individuals had incomes below the poverty level. Berkeley's work force is basically white collar; the census reported that 7 out of 10 in the work force were in that category. The census also reported that 15.4% of the workers used public transport for work trips and that 22% of Berkeley workers worked outside of Alameda County.

Household Mobility - Over 70% of the census tracts in Berkeley have a higher percentage of autoless households than the general household population of the region or the county; those tracts are in the flatlands area where minorities dominate and around the University where the student population is large. One out of 5 census tracts in Berkeley have a greater percentage of households owning two or more autos than the countywide household average of 36%; these tracts are in the hill area where higher income residents live and the present public transit service is relatively poor.

Neighborhood Characteristics

In April 1973, Berkeley voters approved an ordinance that called for a revision of the Master Plan into a policy document that would preserve and enhance the neighborhoods of Berkeley. The Master Plan Revision staff analyzed the Berkeley community to determine neighborhood boundaries and their interests. Figure B-1 also identifies neighborhood boundaries defined by the City's revision to the Master Plan. The neighborhoods and some of the key characteristics that impinge upon transit system design are noted in the following section. Detailed neighborhood characteristics are described in the Community Profile Reports of the Master Plan Revision.

West Berkeley - The West Berkeley neighborhood area contains most of the industrial land in Berkeley; over one-half of the area is devoted to industrial uses. The residential area has a density of 44 persons per acre which is slightly above the city-wide average of 39 persons per acre. This area has the highest percentage of young residents--18 and under--of all the neighborhood areas and the second lowest percentage of elderly residents, 8%. Slightly more than 1 out of 10 of the families and unrelated individuals in the area are on public assistance or welfare. The area is served by north-south transit lines on San Pablo Avenue and east-west lines on University Avenue and Dwight Way. Access to BART is poor.

South Berkeley - This neighborhood has slightly more older and younger residents than the city-wide average; 1 out of 4 residents are 18 or under and 1 out of 7 are 62 years of age or older. The residential density is 15% above the city-wide average. This neighborhood contains the highest ratio of families and unrelated individuals on public assistance or welfare (28%) of all neighborhoods in the city.

The area is served by the Ashby BART station and transit lines on San Pablo, Sacramento, Adeline and east-west service on Ashby and (peak hours only) Alcatraz.

San Pablo - The San Pablo neighborhood area has residential densities slightly less than the city-wide average. One out of 6 of the residents are 62 years of age and over and more than 1 out of 4 residents are 18 years of age or less. Only four Berkeley neighborhoods have higher percentages of young or old residents as the San Pablo area.

All of the transit service is on streets that border the neighborhood: Sacramento, San Pablo, Ashby, and Dwight Way. Bus service to downtown Berkeley (Route 65) and to BART (Routes 17 and 65) is infrequent.

Sacramento-University-Dwight Way-San Pablo (SUDS) - This area has a high number of the young, 1 out of 3 residents are 18 or under, and a large number of elderly, almost 1 out of 6 residents are 62 years of age or over. Only the West Berkeley area has a higher proportion of young among its residents. The residential density is slightly above the city-wide average.

Transit service is provided by bus routes on San Pablo, Sacramento, Dwight Way and University Avenue, the streets that mark the boundary of this neighborhood area.

Westbrae-University Gardens - This area has a higher percentage of the young than the city-wide average and about the same percentage of the elderly as exists city-wide. The residential density is slightly lower than the city-wide average. Average income of the households is \$8,045 per year, slightly higher than the city-wide average of \$7,341. AC Transit line #43 runs through the area and service is provided on the borders of the area by lines on San Pablo, University and Sacramento Avenues.

McGee - This neighborhood has a residential density that is slightly above the city-wide average. Most of the area consists of single family homes with a few multi-unit structures on the perimeter of the area. Almost 30% of the residents are 18 years of age or younger and about 1 out of 8 residents are 62 years of age or older, only slightly above the city-wide average. About 1 out of 9 families are on public assistance or welfare; that ratio is only exceeded by one other neighborhood, South Berkeley Model Neighborhood Area. Transit service is provided by buses on Sacramento, Dwight Way, Ashby and Grove Streets. The Ashby BART station is located within a few blocks of the southeast corner of this neighborhood.

Flatlands - This is basically a residential neighborhood with commercial activities along University Avenue; the density of 46 persons per acre is slightly higher than the city-wide average of 39 persons per acre. The average income of about \$6,000 per

household is less than the city-wide average of over \$7,000 per year. The percentage of the young and elderly among the population is about equal to the percentages in the general population of Berkeley. The Flatlands is served by transit service on University, Sacramento, Grove and Dwight Way, all perimeter streets.

North Berkeley - This is a stable residential neighborhood with household incomes only slightly below the city-wide average and a residential density of 46 persons per acre, slightly above the city-wide average. There is a slightly lower percentage of the young and elderly in the North Berkeley neighborhood than there is in the city-wide population. Heavy rush hour traffic on Hearst and Cedar has created problems for this neighborhood. Transit service to the area is provided on Sacramento, Grove, University and Shattuck.

Cow Hollow - This area consists mainly of older single family homes with a residential density 32 persons per acre. The ratio of young and the elderly to the population of the neighborhood is slightly greater than the city-wide averages. The average household income is almost \$10,000 per year, above the average for the city. North-south transit service is provided by buses on Grove and Sacramento. There are no east-west lines that serve this neighborhood.

Thousand Oaks - This is a low density residential area, 24 persons per acre, with household incomes that average about \$13,000 per household. Thousand Oaks has the highest percentage of of all Berkeley neighborhoods. Over 22% of the residents are 62 years of age or older. Also, over 1 out of 4 residents are 18 years of age or younger. Much of the area consist of hills with winding streets. This creates a problem for transit buses both because of grade and the sharp corners. Transit service to the area is provided on Solano and Colusa.

Hill Area - This large area in the northeast section of Berkeley has the highest median household income and the lowest residential density. Average family incomes are \$14,611 per year and there are 20 persons per acre. The ratio of elderly in the neighborhood is approximately the same as the city-wide ratio; 1 out of 4 of the residents are 18 years of age or younger as compared to the city-wide ratio of 1 out of 5. The winding streets and hilly area creates a problem for regular transit operation in the area. Two lines (7 and 67) serve the area.

Hillside - This area consists of gently slopping and hilly terrain. The residential density is low, 24 persons per acre. Less than normal number of the residents are young and over 18% of the residents are 62 years of age or older. The average family income is \$12,000 per year. North-south transit service is provided on Spruce and Euclid.

Downtown - The downtown area contains the Central Business District, Berkeley High School and the City Hall complex. Many students and singles live in the area. The population of this area contains about the same percentages of elderly as the general population. Over 3 out of 4 residents are in the 18-34 year age bracket. Few are under 18. In the residential sections, the density is the greatest in the City--over 400 per acre. The mean family income is low, over one-third are below poverty level. The Downtown area has excellent transit service on all of the main streets as well as access to the Berkeley BART line.

LeConte - The LeConte neighborhood is dominated by the 18-34 year age group. Three out of 5 of the residents are in that age group. The area has fewer young people than the city-wide average and about the same percentage of elderly as exists in the general population. Family income is only \$5,000 per year as against a city-wide average of over \$7,000. Residential density is 53 persons per acre, above the city-wide average. Two residential streets, Fulton and Ellsworth, carry a heavy load of commute traffic which has been a sore point for area residents.

Both north-south and east-west transit service is provided the area. Transit operates on Telegraph, Ashby, Dwight Way and Shattuck.

Bateman - This residential neighborhood contains Alta Bates hospital and a shopping area at Telegraph and Ashby. Residential density is 46 persons per acre. Almost 1 out of 5 of the residents of the area are 62 years of age or older--a percentage that is only exceeded by the Thousand Oaks area. There is a lower percentage of young persons in the area than there is in the general population. Frequent transit service is provided on the Telegraph and College north-south transit routes; less frequent east-west service is provided by the Ashby bus route.

Willard Park - Almost 70% of the residents are in the 18-34 year age group. The percentage of the young and the elderly is less than the city-wide average. Average family income is less than \$5,000 per year and the residential density of 58 persons per acre is almost 50% greater than the city-wide average. Frequent north-south service is provided by buses on Shattuck and College with less frequent service provided by buses on Ashby.

Claremont-Elmwood - This is a low density residential area with a few scattered multi-unit structures. The density is 27 persons per acre as against a city-wide average of 39 persons per acre. The average family income is \$12,000 per year which is much higher than the city-wide average. Elderly and young residents are found in slightly greater ratios than are found in the general population. Service to the area is provided by frequent buses on College and less frequent east-west service being provided by bus loop on Dwight Way and Ashby.

South Campus - This area on the south side of the University of California is dominated by students of the University. About 70% of the residents are students with almost 9 out of 10 of the residents being in the 18-34 year age group. Residential

density is 86 persons per acre, a density that is only exceeded by the Downtown area of Berkeley. Traffic is usually congested in this area. During special events at the University, such as football games, traffic can come to a halt. Frequent service is provided by buses on College and Telegraph with less frequent service in the east-west direction by a bus on Dwight Way.

Northgate - This neighborhood area is on the north side of the University campus. Housing is more expensive than on the south side of the campus. Density is high, 68 persons per acre. Almost 70% of the residents are in the 18-34 year age group and 10% of the residents are 62 years of age or over. Transit service is provided by bus routes on Euclid and Oxford in the north-south direction. Service is not considered adequate.

Savo Island - This neighborhood is the location of an ice skating rink, the University of California Corporation Yard, the Berkeley Adult School and a Pay'n Save and a Safeway market. Herrick Hospital plans to convert a vacant lot in the area into a parking lot. The residential sections of this neighborhood has a density of 56 persons per acre. The average income is under \$5,000 per year and 52% of the residents are between 18 and 34 years of age. Almost 1 out of 4 of the residents are 18 years of age or under; less than 1 out of 10 are 62 years of age or older. North-south transit service is provided by buses on Shattuck, Grove, and Adeline; east-west service is provided by the bus service on Dwight Way. The Ashby BART station is located near the south-east corner of the neighborhood.

Employment Characteristics

There are three principal employment generating areas in Berkeley: the University of California and adjacent public and private institutions, the West Berkeley industrial area, and the Central Business District. Other clusters of employment are the neighborhood shopping areas, Claremont Hotel and the two hospitals, Alta Bates and Herrick.

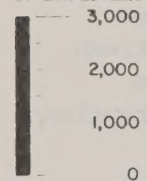
Extensive research and surveys were made to establish the level of employment in Berkeley and the location for each installation that employed 20 or more workers. City records, employment information from the Berkeley Chamber of Commerce and contacts with the employers were all used to establish the level and type of employment that exists in Berkeley. The results were tabulated and mapped on a Transit Zone map of Berkeley which was used for the design and evaluation of transit concepts. Figure B-2 shows the employment distribution for the West Berkeley area and the location of other major employment installations.

Major Employers - The University of California, with almost 10,000 employees is the largest single employer in Berkeley. Cutter Laboratory, in the West Berkeley industrial area, with about 800 employees is the largest industrial employer in Berkeley. There are almost 12,000 employees in the industrial area of Berkeley. In the Central Business District, there are almost 2,500 employees with 2,000 of them engaged in the retail trade and service sector. In the health sector, Herrick and Alta Bates hospitals with 800 and 600 employees respectively are the major employers. Hinks Department store is the major retail service employer with approximately 400 employees in the Central Business District. The City Hall complex with approximately 2,000 city and county employees is the major government employment location.

Over 200 establishments with 20 or more employees were found in Berkeley; 80 of these were industrial concerns located in the West Berkeley Industrial area. Over one-half (47) were in Transit Zones 12-15, the southwest section of the industrial area. There were 42 retail establishments with 20 or more employees with the largest concentrations found along Shattuck Avenue in the downtown area. Others were scattered around the city. Fifty-seven of the establishments with 20 or more employees were private establishments that provide service to the public with the highest concentrations located in the downtown sector.

**FIGURE B-2
DISTRIBUTION
OF EMPLOYMENT**

NUMBER
OF EMPLOYEES



ZONE NUMBER
ZONE BOUNDARY

20

0 5 1 MILE



Employment Types - A plurality of the employed residents of Berkeley work for government establishments (40%) according to the census reports; 27% work for educational institutions, 13% work for wholesale and retail trade and 10% work in manufacturing with a like amount in the service industry. Of the 22% who work out of Alameda County, the vast majority commute to San Francisco. The University of California and the downtown area, including the government installations in the area, are the chief centers of employment for Berkeley residents in Berkeley. Few work in the West Berkeley industrial area.

Journey to Work - Surveys conducted by the Berkeley-Albany Industries Association show that only about 18% of the workers in the area are Berkeley residents. Most come from north of Berkeley (45%) with 25% coming from Oakland and beyond and 12% commuting from the Walnut Creek area. Transit utilization by workers in the industrial area of Berkeley is low. Only 8% of the workers used public transportation for work trips according to the industry survey while 15% of Berkeley residents use transit for work trips. According to a survey conducted by the Bank of America, 25% of Berkeley area Bank of America employees use transit for work trips. The survey of workers in the industrial area indicated that 35% of the workers would use transit for work trips if the service was improved to include direct bus connections and improved BART feeders.

Activity Centers

In addition to surveying and mapping employment locations, community and service activity centers were researched, tabulated and mapped through the following techniques:

- . an on-site survey of all commercial areas was made;
- . community organizations and businesses were contacted to ascertain staff and amount of visitation and meetings;
- . questionnaires were distributed to individuals to ascertain their travel behavior;
- . the staff and client loads of public institutions was obtained.

The results of that investigation are summarized by Figure B-3. The major non-work activity areas are the University of California with almost 30,000 students, two-thirds of whom live in Berkeley; the downtown Central Business District; neighborhood shopping districts; supermarkets; and the secondary schools. Lesser levels of activities occur around parks and neighborhood meeting places.

Shopping Areas - There are seven major commercial shopping districts in Berkeley. They generate many shopping trips each day and contain 3 out of 5 of Berkeley's retail and service establishments. The largest of the shopping districts is the CBD where about 1 out of 5 of the retail and service outlets are located. The BART station, Hinks and the J.C. Penny department stores are primary attractions.

The Sather Gate shopping district at the Telegraph Avenue entrance to the University of California is the second largest shopping district in the city with one-eighth of the city's retail and service outlets. Apparel shops, specialty shops and restaurants are the main attractions. The sidewalk vendors add to the color and are a source of attraction.

The University and San Pablo shopping district contains a variety of small businesses: a pharmacy, a bank, thrift store, fast food facility, barber shop, and bakeries. Almost 7% of the city's retail and service outlets are located in this area.

The Solano Avenue shopping center has about 7% of the retail and service establishments in the city. Finance, insurance, real estate and professional service firms complement the specialty shops, restaurants and large supermarket in the area.

The Elmwood shopping district, located on College between Stuart and Webster, has several new specialty shops spread among the area's older retail businesses and services. About 4% of the city's retail and service outlets are located in this district.

**FIGURE B-3
MAJOR TRIP
ATTRACTORS**

LEGEND

HOSPITALS

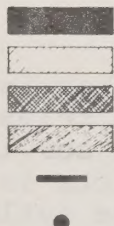
SECONDARY SCHOOLS
UNIVERSITIES

MAJOR
COMMERCIAL AREAS

OUTLYING
EMPLOYMENT AREAS

BART STATIONS

MARKETS



The North Shattuck shopping district attracts neighborhood and city-wide shoppers alike. There are three supermarkets, numerous personal services, specialty shops, and insurance and real estate establishments. Almost 4% of the city's retail and service establishments are located in this district.

About 40% of Berkeley's retail and service outlets are outside of the principal shopping districts. The major attractors outside of the shopping districts are the Co-Op installations on University near Sacramento, the BBB Discount Store on Gilman and San Pablo, the Co-Op supermarket at Ashby and Telegraph and the Pay'n Save and Safeway retail outlets near Adeline and Shattuck.

Schools - Another major trip attractor in Berkeley is the public schools. The Berkeley Unified School District provides transportation for primary school children; secondary school pupils must provide their own transportation to school. Much of this transportation is done by public transit. There are two schools for the 7th and 8th grades: King and Willard Jr. High Schools; one school for the 9th grade, West Campus of Berkeley High; and Berkeley High School for the 10-12 grades. Additionally, there are other experimental schools for which the Berkeley Unified School District does not provide transportation for the students.

The secondary schools produce many student and visitation trips each school day. Because there are only two Jr. High Schools, one school that serves 9th graders and a single High school, trips to those schools occur from all parts of the city.

The enrollment at the secondary schools are as follows:

. Berkeley High	2,899
. East Campus	232
. King Jr. High	1,238
. Odyssey	98
. Willard Jr. High	841
. West Campus	1,026

The students and visitors to the University of California make it the single largest trip generation facility in the area. Almost 30,000 students attend the University with almost two-thirds of them living in Berkeley, about 10% live in Oakland, slightly over 5% live in the Albany/El Cerrito area and slightly under 5% commute from San Francisco.

Day Care Centers - There are about 60 Day Care Centers in Berkeley most are small. Only about 25% care for more than 20 young children and slightly more than 1 out of 8 care for more than 40. The Day Care Centers are located in various sections of the city and are both publicly and privately operated. The locations of the Day Care Centers were catalogued on a reproducible work map to assist in the development and evaluation of alternative transit concepts.

Churches - Ninety-four churches were located and catalogued during the course of this study. Some of the church facilities are used for community activities and affect travel activity in the neighborhoods. Additionally, Day Care Centers and Senior Citizens groups use church facilities for meetings and activities. For example, the South Berkeley Senior Citizens group meets at McGee Baptist Church and the Thousand Oaks Baptist Church operates a Child Care Center.

Parks, libraries, post offices and community centers also serve as a focus for activities and local trips. The location of these facilities were similarly catalogued on a reproducible work map. Visitation levels at these facilities were obtained and recorded for the design and evaluation of the transit concepts.

Transportation Attitudes

A review of City transportation policy and surveys of individuals and community agencies revealed a very strong support for greater emphasis of transit service.

City Policy - The Berkeley City Council, because of increases in automobile traffic in residential areas, adopted an amendment to the Circulation Section of the Berkeley Master Plan in August of 1968 that states, in part:

.. "Planning for circulation in Berkeley is designed to retain the character and amenity of the city while making reasonable provision for and encouraging new methods for moving people and goods." and

"Berkeley will use every available opportunity to decrease dependence upon the automobile for circulation and encourage innovative experiments toward that end."

This amendment was adopted because of pressures for street widening to accommodate traffic and the aborted pressure for the development of an Ashby Freeway. Some of the objectives of this amendment were to preserve trees and "other amenities adjacent to existing roadways through all possible techniques to improve circulation without resorting to street widening."

In furtherance of that effort, the Neighborhood Traffic Study was instituted to develop plans that could protect local residential streets from undue vehicular traffic in accordance with these Master Plan principles:

- .. In lower density residential areas emphasis is on concentrating traffic on a minimum number of streets....
- .. Reduction of the unnecessary use of local streets can be accomplished by a number of possible techniques including traffic control signs and devices, street diverters, cul-de-sacs, loop streets and appropriate landscaping....

The implementation of the street diverter program has caused some problems; the traffic on some already overcrowded streets became more so. Alleviation of the traffic congestion problem on already crowded streets can only occur if more auto riders

are converted to transit riders. That is the purpose of this study of transit concepts for Berkeley.

In additions to the policies and programs dealing with circulation in Berkeley, action has been taken to enhance the character of Berkeley neighborhoods. The Neighborhood Preservation Ordinance was adopted by Berkeley voters in April 1973. This ordinance calls for a comprehensive planning program to arrive at a new Master Plan for Berkeley that would preserve and enhance the neighborhoods of Berkeley. The new Master Plan, when completed in 1976, will contain city-wide policies for development and a series of specific and feasible Community Plans that have been developed with community participation. Circulation and transportation within the neighborhoods will be one of the elements of the revised Master Plan. This Berkeley Coordinated Transit Study as been developed with full interplay between the Master Plan Revision staff and members of the transit study team to assure compliance with neighborhood concerns.

View of Individuals - Approximately 7300 attitude surveys were distributed at key activity centers in Berkeley during the course of the study. Figure B-4 shows the questionnaire which was employed.

General comments concerning transit service are shown in Table B-2.

BERKELEY TRANSIT PROJECT

The Berkeley Transit Project will recommend ways to improve public transportation for people in Berkeley. You can help by filling in this survey of your own transportation needs.

For information contact Greg Thompson:
Address - 2030 Milvia,
Berkeley
Phone - 845-1865

START HERE

1

Where did you get this survey?

(Name Place) _____

When (Date) _____ (Time) _____

How many times in the last two months have you come here? _____

SOME FACTS ABOUT YOU THAT WILL HELP RELATE YOUR SURVEY TO OTHERS

2

How many in your household?

One ☐ Two ☐ Three ☐ Four or More ☐

How old are you?

Under 12 ☐ 17-21 yrs ☐ 45-65 yrs ☐

12-16 yrs ☐ 22-44 yrs ☐ Over 65 ☐

What is/are your occupation(s)? _____

How much is your household's annual income?

☐ Under \$4000 ☐ \$10,000-\$15,000

☐ \$4000-\$9000 ☐ Over \$15,000

How many years have you lived at your present address? _____ Renting ☐

Owned ☐

Check if you or a member of your household is physically handicapped. ☐

WHERE DO YOU LIVE?

3

a) Berkeley Residents

1) Find your block # on the display map and write here _____, or

2) Write street intersections nearest your home _____ and _____

b) Non-Berkeley Residents

1) What is postal zip code of your home? _____

WHERE DO YOU WORK?

4

a) Berkeley Residents

1) Find your block # on the display map and write here _____, or

2) Write street intersections nearest your job _____ and _____

b) Non-Berkeley Residents

1) What is postal zip code of your job? _____

DO YOU OR OTHERS IN YOUR HOUSEHOLD ATTEND SCHOOL, COLLEGE, UNIVERSITY OR TRAINING COURSES?

5

Yourself: No ☐

Yes ☐, Where _____

Others in: No ☐

Household Yes ☐, Where _____

HOW MANY AUTOMOBILES IN YOUR HOUSEHOLD _____, AND HOW MANY BICYCLES _____?

6

Check if you have an auto available:

☐ During the day ☐ Not at all

☐ During the evening

CHECK IF YOU NEED TRANSPORTATION FOR ANY OF THE FOLLOWING PURPOSES, BUT FIND IT DIFFICULT OR IMPOSSIBLE TO GET:

7

☐ Going shopping for essentials

☐ Getting health care

☐ Education or training

☐ Going to social service agency

☐ Job hunting

☐ Participating in community affairs

☐ Other, specify _____

8

DESCRIBE THE TRIPS YOU TOOK YESTERDAY

Please fill one line per trip

If you live in Berkeley, please name

TRIP	WHY DID YOU GO ? (Check one purpose)					WHERE DID YOU GO ? (Write in general location of place) e.g. Downtown Berkeley, U.C. of Berkeley, Neighborhood Store	HOW DID YOU GET THERE ?						
	Shopping	Work	Education	Recreation	Other		Auto	BART	Bus	Taxi	Walk	Car-pool	Other
1st	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐
2nd	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐
3rd	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐
4th	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐
5th	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐
6th	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐
7th	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐
8th	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐
9th	☐	☐	☐	☐	☐		☐	☐	☐	☐	☐	☐	☐

COMMENTS AND SUGGESTIONS

9

About Transportation Problems

Ideas for Public Transit Improvements

Why you don't use Public Transit More

If you want to be on the Project Mailing
List, NAME and ADDRESS:

Table B-2
TRANSIT VIEWS OF INDIVIDUALS

<u>GENERAL COMMENTS</u>	<u>NUMBER OF COMMENTS</u>
More local service	119
More frequent service	105
Need modifications to routes	79
Difficult to carry packages on transit	68
Need more early morning and evening(non peak) service	55
Lower or more convenient fares	52
More weekend service	47

In addition to the general survey, a questionnaire was distributed to visitors to the Berkeley Transit Fair. The purpose of the survey was to obtain community reaction to various candidate vehicles being considered for use in Berkeley. The Transcoach and AC Transit's cut down version of a standard GMC coach used in the Richmond Dial-A-Ride service received the best grades. Table B-3 summarizes the results.

Agency Attitudes - Our survey of local private and public concerns in Berkeley yielded the comments shown in Table B-4.

Table B-3

VEHICLE EVALUATION
BERKELEY TRANSIT FAIR

	Exterior			Interior			Face of Access			Seat Comfort			Accept for Downtown	
	Poor 1	Good 2	3	Poor 1	Good 2	3	Poor 1	Good 3		Poor 1	Good 2	3	Yes	No
Fleetwood	1	1	8	1	3	6	2	4	4	0	6	6	9	1
Dial-A-Ride	1	6	8	0	1	14	0	6	9	0	0	15	13	1
Trans Coach	0	2	15	0	3	14	0	0	17	0	3	14	16	0
Humphry-Go-BART	0	1	2	0	2	1	2	1	0	2	1	0	1	2
Mercedes	0	1	4	0	3	2	1	2	2	1	0	4	4	1
Mercedes 16 Passenger	0	0	1	0	0	1	0	1	0	0	0	1	1	0

Comments:

Fleetwood

Ecology: (2) "In terms of exhaust..., this is the answer."

Interior: (2) "Door too small-risers too high.", "Inside sway and springiness seems to be noticeable", "neat design"

(2) "Recommend a trial in Berkeley", "Reasonably priced, flexible"

Dial-A-Ride

Rack for packages: (2) "Very good", "Just great!"

Interior: (2) "Outstanding", "Extra luxury"

(1) "Will interior hold up to transit use?"

(2) "More seats"

(1) "Wider door and lower steps."

Trans Coach

(7) Ease of access: "Excellent", "Wide doors, good steps", "Low step particularly good", "Lots of accessibility and comfort"

(2) "Best in comfort and appearance."

Humphry-Go
BART

(2) "Steps too high - no head room", "Too low - Head hitter"

(1) "Door access and seats too close"

Mercedes
(1)

(2) "Head room better than Humphry-Go-BART..., poor leg room."

(1) "Practical interior."

(1) "Fuel economy"

(1) "Comfortable and convenient" (From previous experience).

Table B-4

QUICK LOOK ANALYSIS SHEETS

BERKELEY TRANSIT PROJECT AGENCY & COMMUNITY GROUP QUESTIONNAIRE

Group or Agency	Response Category	Transit Dependent Group	Area of Residence	Most Pressing Trip Problems	Comments
1) Young Adult Project (Weldon Rucker) 3051 Adeline St.		Youth Low-income	South Berkeley		
2) Sr. Center of Berk. (Aileen Himbert)		Elderly Low-income Disabled	Berkeley		Short steps on bus; free fare shuttle buses
3) Sr. Citizens Center (Mrs. Gains)			South Berkeley		Low fares; shuttle; emergency
4) Herrick Hospital (Gary Passama)		All	Berkeley		Need jitney buses
5) Alta Bates Hospital		All	Berkeley		BART schedule needs improvement
6) Cal Farm Insurance (Dale Moon)					
7) Berk. Citizens United (John Owsley)		Elderly	Many out- side city		Crime after dark; public transit should be privately operated
8) Women's Faculty Club (Mrs. Uriog)					
9) Ala. City Assn. for Mentally Retarded		Handicapped	A few out- side of city		

Table B-4 (Continued)

QUICK LOOK ANALYSIS SHEETS

BERKELEY TRANSIT PROJECT AGENCY & COMMUNITY GROUP QUESTIONNAIRE

Group or Agency	Response Category	Transit Dependent Group	Area of Residence	Most Pressing Trip Problems	Comments
10) Asian Amer. Comm. Alliance (Tom Chow)		Youth	Few out-side city		
11) Neighborhood Legal Service		Poor	Berkeley		
12) Women's Center YWCA		Students	Few out-side city		Need safe and cheap travel
13) Berk. Youth Alternatives		Youth	Many out-side city		
14) Center for Independent Living		Disabled	Few out-side city	Medical appointments	Dial-A-Ride; wheel chair ramps on sidewalks; bus provision for wheelchairs
15) Disabled Student Program (Phillip Draper)		Disabled	Few out-side city	All	Curb ramps at bus stops; shelters; bus provision for wheelchairs
16) Audubon Center			Many out-side city		Better transportation to flatlands; bike paths; buses to Bay Area
17) Amer. Chemical Soc. (Dr. Nixon)			Many out-side city		Frequent buses; bike lanes; encourage walking
18) Bay Area Citizen Action			Many out-side city		Mini buses; feeders to BART; reduce auto traffic

Table B-4 (Continued)

QUICK LOOK ANALYSIS SHEETS

BERKELEY TRANSIT PROJECT AGENCY & COMMUNITY GROUP QUESTIONNAIRE

Group or Agency	Response Category	Transit Dependent Group	Area of Residence	Most Pressing Trip Problems	Comments
19) Bateman Neighborhood Association (Frank White)			Neighborhood		Ashby bus frequency; feeder from BART & downtown; neighborhood to University
20) Mahase Block Tanning 1300 Fourth St. (Burt Strum)			E. Bay		
21) Del Monte 2600 7th St.			Bay Area		
22) Bank of American (University) (Susan Bruce)			Neighborhood		
23) Bank of America Telegraph & Russell			Bay Area		
24) Bank of America South Berkeley			Berkeley		
25) Airco Temescal 2850 7th St.					65 line connection to BART is poor--takes too much time
26) Cutter Labs 4th & Parker					AC changed bus that previously went to plant

Table B-4 (Continued)

QUICK LOOK ANALYSIS SHEETS

BERKELEY TRANSIT PROJECT AGENCY & COMMUNITY GROUP QUESTIONNAIRE

Group or Agency	Response Category	Transit Dependent Group	Area of Residence	Most Pressing Trip Problems	Comments
27) Dymo 6701 Bay St.			Bay Area		Without car it is difficult to get to work
28) Pacific Steel Castings 1333 2nd St.			Berkeley		Bus stop four blocks away
29) E. Bay Skills Center (Mr. Jones)		Low-income unemployed	East Bay		Trainees have problems with transportation to interview & get to jobs
30) Interdenominational Ministerial Alliance (Rev. Frank Pickard)		Ministers	Many out-side city	Work trips education	AC does a good job; detest BART (conspiracy against the poor)
31) Ecology Center (Kathy Evans)			Many out-side city	Shopping work	Need more bus lines; downtown elephant trains
32) College Ave. Care Home (John Newton)		Elderly	Many out-side city		Semi-private bus service; more & better buses; better scheduling
33) Florence Mertie		Elderly	Berkeley		Mini-bus; special bus for handicapped; Dial-A-Bus
34) Dar Dell Lodge (Thelma Williams)					Mini-bus service
35) St. Moritz Ice Skating Club			Many out-side city		Need better parking

Table B-4 (Continued)

QUICK LOOK ANALYSIS SHEETS

BERKELEY TRANSIT PROJECT AGENCY & COMMUNITY GROUP QUESTIONNAIRE

Group or Agency	Response Category	Transit Dependent Group	Area of Residence	Most Pressing Trip Problems	Comments
36) Rainbow Sign			Many out-side city		Too many cars; late night commuting not good
37) League of Women Voters (Janet Johnson)			Few out-side city	Neighborhood shopping work	Has a position paper
38) Hillel Street Work Program (Blona Ruhs)	Youth disabled unemployed sick		Berkeley	Work recreation	
39) Grey Panthers (Margaret Montague)	Elderly		Berkeley & few out-side city	Health needs neigh. shopping	Need coordinated system to meet needs of elderly; east-west buses
40) Family Serv. of Berkeley (Angie Haynes)	Students Elderly Disabled		Neighborhood	Getting clients to center	
41) Dream for Berkeley (Ruth Hunt)			Berkeley	.	Need after dark parking safety
42) Disabled Students Union (Phil Chavez)	Students Disabled		Berkeley few out-side	All	Dial-A-Bus system needed; BART phones cannot be reached from wheelchairs
43) Adeline/Ashby Merchants (Jack Mitts)			Many out-side city		
44) Co-Op Center Council (Bonnie Kuhl)			Neighborhood shopping		Mini-buses; trying car pools

B-25

INTRODUCTION

The Berkeley Transit Project will develop and recommend an action program to improve public transportation serving Berkeley. A description of the public transportation now serving Berkeley is the starting point for understanding and evaluating alternate transit improvement proposals.

The City of Berkeley is provided public transportation at various levels by several agencies. Their services include bus transport, rail rapid transit, school buses and special services, including taxis. These services are described in this memorandum. The three principal public transit operators in Berkeley, A.C. Transit, BART and the Berkeley Unified School District, are discussed first followed by a description of the University of California bus services, local Berkeley taxi services and miscellaneous special programs. Finally, connections between local and national public transportation serving Berkeley are described.

ALAMEDA-CONTRA COSTA COUNTY (A.C.) TRANSIT

A.C. Transit operates the most extensive public transportation service in Berkeley, and service to Berkeley is an integral part of A.C. Transit's total system. Of A.C. Transit's 16 transbay routes, four primarily serve Berkeley and another passes through the city. A.C. Transit has 40 local and 8 express East Bay routes. Only one of these 48 routes operates entirely within Berkeley and 17 operate in or through it. Nine percent of the total bus miles A.C. Transit operates daily are within Berkeley.^{1/} These routes connect the city by public transportation to Oakland, downtown San Francisco and many other Bay Area destinations.

The A. C. Transit District was created by enabling legislation passed in June, 1955 and approved by voters in November, 1956. Its 175-square mile service area generally encompasses the area west of the Berkeley-Oakland Hills from El Sobrante to Hayward. Provisions in the enabling act allow for both the addition and the withdrawal of communities to the District. Newark and Fremont recently joined the District and areas of Central Contra Costa County are considering joining.

^{1/} 8.4% of the 88,805 weekday bus miles are within the city limits of Berkeley, if add 10% for Berkeley's share of deadhead mileage then equals 9.2%.

Service Characteristics

A.C. Transit's coverage, route structure, schedules, hours of service, fares, schedule adherence, load factors, speeds and rideability were assessed to determine both the quantity and quality of service provided in the Berkeley area. Overall, the quality of service provided and A.C. Transit's management efficiency were found to be very good.

Coverage - A.C. Transit operates 18 routes serving the Berkeley area including four transbay routes, two East Bay express routes and 12 local routes. Approximately 97 percent of Berkeley's residents are within one-quarter mile of an A.C. Transit route. A.C. Transit provides access to all five BART stations serving Berkeley, all major shopping centers, hospitals, schools and parks. Thus, A.C. Transit coverage of Berkeley is good.

Routes - A.C. Transit Company has numerous variations to their basic 18 Berkeley routes designed to serve specific needs during different times of the day. The routes provide three basic types of service: transbay, East Bay express, and East Bay locals. Transbay routes are designated by alphabetical letters while East Bay routes are assigned numbers. The route descriptions, type of service and a simplified description of service variations during the day are given in Table 1.

Schedules - A.C. Transit generally does not operate on memory headways (consistent multiples of 5, 10, 15 or 20 minutes, etc.). Instead, vehicles are scheduled to maximize use of vehicles and according to special needs of routes. Table 2 shows the approximate headways of respective routes during different times of the day.

Research has generally shown that passengers arrive at bus stops at random times for routes with headways less than 12 minutes. Passenger arrival times for routes with 15-minute and longer headways were found to be less random, with passengers tending to arrive several minutes before the scheduled bus. Passengers transferring between bus lines, however, do not have the freedom to select their arrival time at the bus transfer point and, therefore, frequently must wait long intervals for their transfer. Table 3 shows average transfer times calculated between typical A.C. Transit routes in Berkeley.

Table C-1

A.C. TRANSIT ROUTES SERVING BERKELEY
Berkeley Coordinated Transit Project
July, 1974

TRANS BAY

E Route - Originates at the San Francisco Transbay Terminal and goes to the Claremont Hotel via the Bay Bridge, MacArthur Boulevard, Adeline, Yerba Buena Avenue, Fortieth, Market, Fifty-Fifth, Vicente, Ayala, Miranda, Claremont, Russell and Domingo Avenue.

F Route - Originates at the San Francisco Transbay Terminal and goes to Albany via the Bay Bridge, MacArthur, Adeline, Yerba Buena Avenue, Fortieth, Market, Adeline, Shattuck, Henry, Sutter, thru the tunnel to The Alameda, Solano, Jackson and Buchanan to San Pablo Avenue.

G Route (Peak Hours Only) - Originates at the San Francisco Transbay Terminal and goes to Solano and The Alameda in Berkeley via the Bay Bridge, MacArthur, San Pablo Avenue, Solano, Peralta, Marin, Ordway and Solano Avenue.

H Route (Peak Hours Only) - Originates at the San Francisco Transbay Terminal and goes to El Cerrito via the Bay Bridge, Eastshore Freeway, Ashby, Sacramento, Hopkins, Monterey, Marin, Arlington, Barrett and Tulare Avenue.

EAST BAY EXPRESS

Route 33 - Originates on Alameda Island and goes to Albany via Park Street, Twenty-Ninth, Ford, Twenty-Third, the Nimitz Freeway, Oak, Tenth, Broadway, Telegraph, West Grand, Valley Street, Jack London Square, Broadway, Telegraph, Twenty-Seventh, the Grove-Shaffer Freeway, Grove, Adeline, Shattuck, Henry, Sutter, Hopkins, Contra Costa Avenue, Los Angeles, The Alameda to Solano Avenue. A peak hour variation, the 33R extends north to Richmond.

Table C-1
(Continued)

EAST BAY EXPRESS (Continued)

Route 37 - Leaves Merritt Hill Campus via Campus Drive and goes to San Pablo Avenue in Berkeley via Campus Drive, Redwood, Mountain, Joaquin Miller, Warren Boulevard, Park, Mountain, Moraga, Warren Boulevard, Landvale, Tunnel Road, Ashby, Adeline, Shattuck and University Avenue.

EAST BAY LOCALS

Route 7 - Originates from Grizzly Peak Boulevard and Shasta Road and goes via Grizzly Peak, Euclid, Hearst, Shattuck, Center, Grove, The Alameda, Monterey, Marin, Arlington, Barrett, Ellerhorst, Charles, Tulare, to Barrett Avenue in El Cerrito.

Route 15 - Originates at the U.C. Berkeley West Campus gate and goes via Center Street, Shattuck, Center, Grove, Ashby, Adeline, Grove, Fortieth, MacArthur BART station, Grove, San Pablo Avenue, Washington, Twelfth, Dam, First Avenue, Lakeshore, East Eighteenth, Eighth Avenue, East Twenty-fourth, Fourteenth Avenue, MacArthur, Thirty-Fifth Avenue, Redwood, Aliso, Carson, and Mountain to Knoll Avenue.

Route 17 (Only Weekdays) - Leaves College Avenue and Broadway in Oakland via College, Bryant, Manila, Broadway, Patton, Chabot, Presley Way, Miles, Rockridge BART station, College, Alcatraz, Adeline, Grove, Ashby, to the Ashby BART station. During peak hours the route then runs to the MacArthur BART station, via Alcatraz, San Pablo, Sixty-Fifth, Hollis, Yerba Buena and Fortieth Street.

Route 40 - Originates at the San Leandro Hospital and goes to the Center Street BART station via MacArthur Boulevard, Foothill, Dutton, Marlow, Reverie, Foothill, MacArthur, Foothill, First Avenue, Twelfth, Broadway, Telegraph, Bancroft Way, Fulton, Oxford to Center Street.

Route 43 - Originates at Bancroft Avenue in San Leandro and goes to Albany via East Fourteenth, 148th Avenue, Bancroft, Ninth Avenue,

Table C-1
(Continued)

EAST BAY LOCALS (Continued)

MacArthur, Foothill, First Avenue, Twelfth, Broadway, Telegraph, Grand, Twelfth, Broadway, Telegraph, Shattuck, University, Sacramento, Delaware, Virginia, Sacramento, Hopkins, The Alameda, Marin, Colusa, Solano, Jackson, Buchanan, Cleveland and Solano to San Pablo Avenue.

Route 51 - Leaves the Berkeley Marina via University Avenue, Shattuck, Bancroft/Durant, College, Broadway, Seventh, Webster, Santa Clara, Broadway, San Jose, High and Fernside Boulevard going to Alameda.

Route 65 - Leaves the North Berkeley BART station and goes to Dwight Way and Seventh Street via Virginia, Sacramento, Cedar, San Pablo, Ashby, Grove, Adeline, Ashby, Claremont, Russell, Claremont, Belrose, Derby, Warring, Piedmont, Haste/Dwight Way, Shattuck, Center, Milvia, Haste/Dwight Way, Grove, Dwight Way, Seventh, Channing and Dwight Way.

Route 67 - Originates north of Berkeley at Grizzly Peak and Spruce and goes to El Cerrito via Grizzly Peak, Beloit, Prudue, Kenyon, Trinity, Beloit, Cambridge, Yale, Vassar, Kentucky, Maryland, Vermont, Colorado, Boynton, Florida, Santa Barbara, Montrose, Spruce, Rose, Oxford, Hearst, Shattuck, Center, Grove, The Alameda, Tacoma, Colusa Fairmount Central Richmond, Stockton, Kearney, Eureka, San Pablo and Stockton.

Route 72 - Begins at Eleventh and Broadway and operates via Broadway, Telegraph, Twentieth, San Pablo, Potrero and three different paths to Richmond.

Route 73A - Originates at Eleventh and Broadway and goes to Gilman via Broadway, Telegraph, Twentieth, San Pablo, Ashby, Potter, Seventh, Dwight Way, Crescent, Sixth, Camelia, and Fifth.

Route 88 - Leaves the North Berkeley BART station via Delaware, Sacramento, Alcatraz, Adeline, Stanford, Sixty-First, Adeline, Market, Fourteenth, Broadway, Twelfth, Market, Tenth, Union, Twelfth, Market, Tenth, Union, Twelfth, Wood and Seventeenth to the Southern Pacific station.

Table C-2

APPROXIMATE A.C. TRANSIT WEEKDAY HEADWAYS
July, 1974

<u>ROUTE</u>	<u>A.M. PEAK^{1/}</u>	<u>P.M. PEAK^{1/}</u>	<u>MID-DAY</u>
E	6 minutes	5 minutes	30 minutes
F	2 minutes	2 minutes	10 minutes
G	6 minutes	6 minutes	-
H	5 minutes	7 minutes	-
7	10 minutes	13 minutes	30 minutes
15	13 minutes	10 minutes	15 minutes
17	21 minutes	20 minutes	45 minutes
33	12 minutes	13 minutes	15 minutes
37	60 minutes	54 minutes	60 minutes
40	12 minutes	12 minutes	15 minutes
43	15 minutes	15 minutes	11 minutes
51	15 minutes	15 minutes	15 minutes
58	15 minutes	15 minutes	15 minutes
65	20 minutes	20 minutes	30 minutes
67	16 minutes	30 minutes	14 minutes
72	8 minutes	6 minutes	10 minutes
73	29 minutes	37 minutes	-
88	12 minutes	10 minutes	15 minutes

^{1/} In peak direction.

Table C-3

AVERAGE TRANSFER TIMES FOR A.C. BUSES (In Minutes)^{1/}
 Midday - Weekdays
 July, 1974

FROM ROUTE	TO ROUTE:								
	F	7	17	33	37 ^{3/}	40	51	65	72
F	-	15	22½	7½	30	7½	7½	15	5
7	5	-	<u>2/</u>	7½	30	7½	7½	15	<u>2/</u>
17	5	<u>2/</u>	-	7½	<u>2/</u>	7½	7½	<u>2/</u>	5
33	5	15	22½	-	30	7½	7½	15	5
37	5	15	<u>2/</u>	7½	-	7½	7½	15	5
40	5	15	22½	7½	30	-	7½	15	<u>2/</u>
51	5	15	22½	7½	30	7½	-	15	5
65	5	15	<u>2/</u>	7½	30	7½	7½	-	5
72	5	<u>2/</u>	22½	7½	30	<u>2/</u>	7½	15	-

^{1/} Assumes transfer waiting time is half the average headway of the bus being transferred to.

^{2/} Routes do not intersect in Berkeley.

^{3/} Students who travel to Merritt College if they use the schedules have an average 7 minute wait for the 37 (range from 3 to 24 minutes).

Hours of Service - The length of A.C. Transit's operation day varies by route. Roughly service begins at 5:00 a.m. and continues to 1:00 a.m. Several routes operate only during peak hours or only during weekdays. Only the 43 route to Berkeley operates 24 hours a day.

Fares - A.C. Transit employs the exact fare plan which requires all patrons to have the exact fare. Drivers do not make change; however, they will accept up to a five dollar bill and issue a refund coupon to the rider.

The basic fare for local trips is 25 cents which is consistent with local fare levels of other major carriers in the Bay Area. A.C. Transit offers reduced fares to senior citizens, youths, high school students, the handicapped and children. Prior to July 1, 1974, A.C. Transit also offered a 20-ride book of tickets for transbay trips. Typical fares for common trips are shown in Table C-4.

In addition to these basic fares, A.C. Transit offers three other special fare programs:

1. Shop-a-round pass
2. Sunday and holiday excursion
3. Bicycle carry-on fare.

The shop-a-round pass costs 25 cents and allows riders to ride free in any direction in the Oakland or San Leandro downtown area between 9 a.m. and 3 p.m. The pass also is valid for a single-zone ride home from the downtown area.

The Sunday and holiday excursion fare allows a rider to travel anywhere in the A.C. Transit Easy Bay service area all day for 60 cents.

The bicycle carry-on fare applies to the Tilden Park bus which has been modified to allow patrons to carry their bicycles on-board the bus; a 25 cent additional charge is assessed for the bicycle.

Transfers - Transfer coupons are issued free upon request to riders and are valid for a 25 cent fare on other A.C. Transit routes. For transbay trips, the additional fare above the basic 25-cent one-zone fare must be paid and the transfer stub presented. Transfers

Table C-4

A.C. TRANSIT FARE STRUCTURE FOR BERKELEY

<u>TRIPS BETWEEN BERKELEY AND</u>	<u>ZONE NUMBER</u>	<u>ADULTS</u>	<u>SENIOR CITIZENS</u> ^{1/}	<u>YOUTHS</u> ^{2/}	<u>STUDENTS</u> ^{3/}	<u>CHILDREN</u> ^{4/}
Berkeley	1	25	10	15	15	Free
Oakland	1	25	10	15	15	Free
Oakland Airport	2	25	10	15	15	Free
San Francisco	Transbay	60	60	20	60	Free
Richmond	2	25	10	15	15	Free
San Leandro	2	25	10	15	15	Free
Hayward	3	25	10	15	15	Free

^{1/} 65 years of age or older, during off peak hours only and with Medicare or A.C. Transit identification.

^{2/} High School students only and only on school days.

^{3/} Age 5 to 16 years old.

^{4/} Under 5 years old accompanied by an adult (maximum 2 per adult).

indicate direction and are not valid completing the return portion of a single trip.

A.C. Transit also offers free transfers from BART service. BART patrons obtain A.C. Transit transfers inside the station turnstile areas. The BART - A.C. transfer is valid for a period of 90 minutes on any East Bay A.C. Transit route serving the issuing BART station. Public transit riders making the return trip from A.C. Transit to BART must pay both A.C. and BART fares. A continuing audit of collected transfers is used to determine the amount BART reimburses A.C. Transit.

Schedule Adherence - Sample observations of selected A.C. Transit routes indicates a questionable adherence to schedule. Three sources of schedule adherence data were reviewed during the analysis. The first were internal records of A.C. Transit which indicated a very high level of schedule adherence; the second source, a class assignment for U.C. Berkeley students, had a smaller sample size and indicated a poor to fair schedule adherence.^{1/} Surveys conducted by the Berkeley City Planning Department also showed poor to fair schedule adherence for selected routes.^{2/}

Table 5 shows data from these studies. A bus was considered to be on schedule if it operated on schedule or within five minutes behind schedule. Buses running ahead of time or more than five minutes behind time were considered to be off schedule, since buses running fast penalize patrons a full headway if they arrive at the bus stop at the scheduled time and buses running later than five minutes begin to jeopardize people's travel plans and patience.

Experience indicates that operating on schedule is less important for routes with headways less than 10 minutes. Passengers tend to arrive randomly at bus stops serving these routes, whereas they tend to arrive shortly before the scheduled bus for routes with headways longer than 10 minutes.

^{1/} University of California Winter 1974 Class in Civil Engineering.

^{2/} Extensive surveys of routes 51/58 and 65, conducted during Summer 1974 by the City of Berkeley Planning Department.

Table C-5

SCHEDULE ADHERENCE
Sample A.C. Transit Peak Hour Service

<u>ROUTE</u>	<u>SOURCE</u>	<u>DIRECTION</u>	<u>RUN OBSER- VATIONS</u>	<u>MEAN (minutes)</u>	<u>RANGE (minutes)</u>	<u>PERCENT ON SCHEDULE</u>
33	Students	South	4	(3)	7	25%
33	A.C. Transit	South	12	3	6	92%
33	Students	North	4	1	9	25%
33	A.C. Transit	North	10	1	5	70%
41A	Students	South	4	(1)	3	60%
40	Students	North	5	4	12	60%
51/58	Students	South	3	0	2	67%
51/58	Students	North	3	1	5	67%
65	A.C. Transit	North	18	2	8	94%

() Denotes ahead of schedule.

Load Factors - Load factors are ratios of the number of passengers riding a bus at a point in time to the seating capacity of the bus. Examination of load factor characteristics help identify which runs are over-crowded, necessitating larger capacity buses or more frequent service. Load factor data gathered by A.C. Transit during the first quarter of 1974 for selected routes during peak hours was reviewed to evaluate load characteristics of lines serving Berkeley.

Passenger loads in excess of 60 were recorded for both F and 51/58 routes and standees were also observed for routes 40, 43 and 72. Maximum loads on lines 40 and 43 were recorded near the closing times for schools and probably can be attributed to U.C. Berkeley and other student patronage.

Travel Speeds - Travel speeds are functions of traffic conditions and passenger on-off activity. A.C. Transit records for November, 1973 revealed the operating speeds shown in Table C-6. Travel speeds were approximately the same for weekdays as for Saturdays and Sundays. With few exceptions, Berkeley routes operate slower than the average system speeds. Detailed analysis of two routes, the 51 and the 65 within Berkeley, indicated that from 15 to 33 percent of the operating time is spent with the doors open, loading and unloading passengers.

Physical Plant

A.C. Transit facilities include: administrative buildings and maintenance plants, buses, shelters, and other properties (utility vehicles, information booth, etc.). A.C. Transit's headquarters are centrally located at Latham Square in Oakland. They have four principal maintenance facilities located in Richmond, Emeryville, East Oakland, and Newark. A.C. Transit's fleet of buses is constantly changing, but currently number 800 with another 120 on order.

Maintenance Facilities - A.C. Transit's maintenance capabilities are first rate in comparison with other transit systems. The maintenance responsibilities are divided into four divisions; division 2 in Emeryville, division 3 in Richmond, division 4 in East Oakland, and division 6 in Newark. Division 2 in Emeryville services approximately 300 vehicles compared to 150 at Richmond and 350 at East Oakland. Berkeley's A.C. Transit service is primarily supported from the Emeryville main-

Table C-6

A.C. TRANSIT OPERATING SPEEDS (Miles per Hour)
November, 1973

<u>ROUTE</u>	<u>WEEKDAY</u>	<u>SATURDAY</u>	<u>SUNDAY</u>
<u>TRANS BAY</u>			
System Average	22.7	24.2	24.5
F	21.0	23.2	24.0
G	20.9	----	----
<u>EAST BAY</u>			
System Average	14.6	14.5	15.3
7	14.5	14.2	15.0
15	13.8	13.4	14.2
17	12.7	----	----
33	14.7	----	----
37	19.2	----	----
40/41/43	13.8	14.1	15.3
51/58	13.1	13.6	14.8
65	12.2	12.2	----
67	13.4	13.1	15.2
72/73	14.6	14.4	15.1
88	<u>12.3</u>	<u>12.0</u>	<u>13.0</u>
AVERAGE TOTAL	17.0 m.p.h.	16.3 m.p.h.	17.2 m.p.h.

SOURCE: A.C. Transit

tenance facility. This is a relatively old facility with maintenance pits rather than hoists. A cursory inspection indicates it is equipped to perform both major and minor maintenance and repair work. Vehicle storage (outdoor) appears fully utilized and more parking may be needed to service additional vehicles.

Buses - A.C. Transit has a large fleet of american design transit buses, mostly manufactured by GMC. A.C. Transit's fleet has grown from 720 buses to about 800 buses in the last two years. Table C-7 presents characteristics of A.C. Transit's fleet. The average bus age is 13 years old and more than 75 percent of the fleet is the new look GMC model bus. Approximately 80 percent of the existing fleet is equipped with two-way radio communications and virtually all of the new buses have automatic transmissions and lock-type fare vaults.

A.C. Transit has an active program of evaluating new equipment. In 1966, A.C. Transit received its first articulated bus, a 77-passenger diesel coach. This year, A.C. Transit is testing articulated buses and standard coaches produced by Volvo of Sweden and M.A.N of Germany. Also, 18 of the 35-foot buses acquired by A.C. Transit in 1960, have been shortened to 25 feet and refurbished for dial-a-ride service.

A.C. Transit has ordered 120 new 51-passenger standard transit buses. The buses operated by A.C. Transit are typical of american designed diesel urban transit equipment. They do not have wide european type doors, overhead package racks or automatically operated exit doors. While A.C. Transit buses are not equipped to carry wheelchairs, several buses are equipped to carry bicycles. Route and designation signs are displayed prominently in front, less so on the right side and are not displayed to the rear or left side.

Table C-7

A.C. TRANSIT BUS FLEET CHARACTERISTICS
June, 1974

<u>NUMBER OF BUSES</u>	<u>MODEL</u>	<u>DATE RECEIVED</u>	<u>SEATING CAPACITY</u>	<u>WIDTH (inches)</u>	<u>LENGTH</u>	<u>COMMENTS</u>
57	SDH-4501	1/61	45	96	118	Air Cond.
5	SDM-4501	6/61	45	96	120	Air Cond.
15	TDH-5304	12/63	51	96	118	--
15	TDH-5304	12/64	51	96	118	--
15	TDM-5304	11/65	51	96	118	--
20	TDH-5304	12/66	51	96	118	--
50	TDH-4516	2/61	45	102	118	Air Cond.
125	TDH-5301	2/61	51	102	120	--
1	TDH-5303	8/67	51	102	118	--
10	TGH-5305	6/63	51	102	118	--
30	TGH-5305	4/69	51	102	118	--
15	TGH-5305	5/69	51	102	118	--
13 <u>1/</u>	TDH-4517	6/61	45	96	118	--
30 <u>1/</u>	TDH-4517	9/62	45	96	118	--
15 <u>1/</u>	TDH-4519	10/63	45	96	118	--
15 <u>1/</u>	TDH-4519	11/64	45	96	118	--
15 <u>1/</u>	TDH-4519	10/65	45	96	118	--
10	TDH-4519	11/66	45	96	118	--
5	TGH-4521	5/68	45	96	118	--
30	TGH-4523	7/73	45	96	118	--
25	TGH-4523	8/73	42	96	118	--
30	TGH-5325	4/71	42	96	118	--
60	TGH-5307	7/72	51	102	118	--
98	TDH-4507	10/47	51	102	118	--
25	TDH-4509	2/49	45	96	112	--
25	TDH-5103	10/50	51	101	116	--
25	TDH-5103	4/51	51	101	116	--
21	TDH-4801	4/58	48	101	114	--
1	XMC-77	1/66	77	96	134	--
120	Flexible	11/74	51	102	40x12	--

1/ Dial-a-bus 18.

Stations and Shelters - A.C. Transit has several large bus shelters at major loading points. Four shelters are located in Berkeley, two on Shattuck Avenue at the Ashby Street BART station, a third on Adeline at Alcatraz Avenue, and the fourth at Shattuck and Durant. The shelters are a modular design and will include benches. Due to P.G. and E. accounting procedures, these shelters will not be provided with interior lighting.

Marketing

A.C. Transit spends approximately two percent a year of their total operating cost, \$27,625,000, for public relations, proportionately more than most Bay Area transit systems. In addition, they maintain a full-time planning and research staff charged with the responsibility to modify service to meet changing market conditions.

The public information program includes, distribution of schedules and route maps, a telephone information service, media advertising, information booth services and instructional lectures. Riders are encouraged to phone for information rather than decipher schedules themselves. The complexity of the typical A.C. Transit schedule (Figure C-1) supports this approach. Riders who use the service for the same trip repetitively, at the same time of day (i.e., commuters), find this service very helpful. However, the effort of telephoning the information center for occasional trips probably discourages many mid-day trips by transit.

Financing

A.C. Transit's overall finance picture effects the service it can provide Berkeley and, in turn, influenced by the costs and revenues of Berkeley service.

A.C. Transit gets revenue from the farebox, from property tax imposed on the residents of the District; from a distribution of a proportion of California State gasoline taxes 3/, and from several Federal grants for capital equipment, demonstrations and studies.

3/ Allocated through the Metropolitan Transportation Commission according to the provisions of SB-325.

**FIGURE C-1
TYPICAL A.C. TRANSIT
SCHEDULE FORMAT**

MONDAY THROUGH FRIDAY														
EL CERRITO TO GRIZZLY PEAK BLVD.							GRIZZLY PEAK BLVD. TO EL CERRITO							
Leave Ter- race & Shev- lin Drive	Leave Stock- ton & Pomona Avenue	Leave San Pablo Stock- ton Avenue	Leave El Cerr- ito BART Sta.	Leave Solano Avenue The Ala- meda	Leave Berke- ley BART Sta- tion	Arrive Spruce Griz- zly Peak Blvd.	Leave Spruce Griz- zly Peak Blvd.	Leave Santa Bar- bara South- ampton	Leave Berke- ley BART Sta- tion	Arrive Solano Avenue The Ala- meda	Arrive El Cerr- ito BART Sta.	Arrive San Pablo Stock- ton Avenue	Leave Stock- ton & Nor- vell Street	Arrive Ter- race & Shev- lin Drive
		5.57	6.00	6.08	6.17	6.28	5.47*	5.55	6.05	6.12	6.19	6.22		
		6.28	6.31	6.39	6.48	6.59	6.28	6.37	6.47	6.55	7.01		7.04	7.08
6.43	6.47	6.50	6.50	6.57	7.10	7.20	6.49*	6.57	7.07	7.13	7.19	7.24		
		7.03	7.03	7.11	7.21	7.32	7.04	7.13	7.25	7.32	7.38		7.41	7.45
7.12	7.16	7.20	7.20	7.28	7.38	7.49	7.23	7.32	7.42	7.48	7.55	7.59		
		7.29	7.34	7.42	7.53	8.04	7.32	7.41	7.53	8.00	8.07		8.10	8.14
7.45	7.48	7.52	7.52	8.00	8.09	8.20	7.49	7.58	8.11	8.19	8.26	8.30		
		8.02	8.08	8.15	8.25	8.37	8.04	8.13	8.26	8.34	8.41		8.59	9.03
8.18	8.22	8.27	8.27	8.34	8.44	8.56	8.25	8.34	8.45	8.52	8.59	9.04		
		8.35	8.42	8.49	8.59	9.12	8.37	8.49	8.59	9.06	9.13	9.17		
9.03	9.07	9.12	9.12	9.19	9.30	9.42	8.56	9.05	9.16	9.23	9.30	9.35		
		9.35	9.41	9.49	10.00	10.12	9.12	9.20	9.30	9.37	9.44		9.59	10.03
10.03	10.07	10.11	10.11	10.19	10.30	10.42	9.42	9.50	10.00	10.07	10.14	10.19		
		10.35	10.41	10.49	11.00	11.12	10.12	10.20	10.30	10.37	10.44		10.59	11.03
11.03	11.07	11.11	11.11	11.19	11.30	11.42	10.42	10.50	11.00	11.07	11.14	11.19		
		11.35	11.41	11.49	12.00	12.12	11.12	11.20	11.30	11.37	11.44		11.59	12.03
12.03	12.07	12.11	12.11	12.19	12.30	12.42	11.42	11.50	12.00	12.07	12.14	12.19		
		12.35	12.41	12.49	1.00	1.12	12.12	12.20	12.30	12.37	12.44		12.59	1.03
1.03	1.07	1.11	1.11	1.19	1.30	1.42	12.42	12.50	1.00	1.07	1.14	1.19		
		1.35	1.41	1.49	2.00	2.12	1.12	1.20	1.30	1.37	1.44		1.48	1.52
1.52	2.07	2.11	2.11	2.19	2.29	2.42	1.42	1.50	2.00	2.07	2.14	2.19		
		2.22	2.24	2.36	2.46	2.59	2.12	2.20	2.30	2.37	2.44		2.48	2.52
		2.37	2.43	2.51	3.01	3.14	2.32*	2.38	2.47	2.54	3.01	3.06		
		2.52	2.58	3.06	3.16	3.30	2.42	2.50	3.00	3.07	3.15		3.18	3.22
2.52	3.06	3.10	3.10	3.18	3.31	3.47	2.59	3.12	3.24	3.33	3.41	3.45		
		3.09	3.14	3.22	3.36	3.50	3.17	3.31	3.42	3.51	3.59		4.02	4.06
3.22	3.26	3.29	3.29	3.37	3.49	4.03	3.34	3.44	3.55	4.04	4.12	4.17		
				4.03	4.17	4.30	3.47	3.50	4.03				4.31	4.35
4.07	4.11	3.53	3.57	4.05	4.16	4.30	3.50	4.00	4.11	4.20	4.28			
			4.13	4.21	4.30	4.44	4.03	4.13	4.24	4.33	4.41	4.46		
		4.23	4.27	4.35	4.44	4.58	4.17	4.25	4.36	4.45	4.53		4.56	5.00
4.35	4.39	4.42	4.42	4.49	5.00	5.14	4.30	4.39	4.50	4.59	5.07	5.12		
		4.51	4.57	5.04	5.15	5.29	4.44	4.58	5.09	5.18	5.26		5.29	5.33
5.00	5.04	5.07	5.07	5.14	5.26	5.41	4.59	5.12	5.24	5.33	5.41	5.46		
		5.15	5.20	5.27	5.40	5.55	5.14	5.25	5.36	5.45	5.52		5.55	5.59
5.33	5.37	5.40	5.40	5.47	5.57	6.11	5.29	5.40	5.48	5.57	6.04	6.09		
		5.47	5.51	5.58	6.12	6.24	5.41	5.49	5.59	6.08	6.14		6.17	6.21
5.59	6.03	6.06	6.06	6.13	6.25	6.37	5.55	6.06	6.16	6.24	6.31	6.35	6.44	6.48
		6.20	6.25	6.32	6.47	7.00	6.11	6.19	6.29	6.35	6.42		6.44#	
6.48	6.54	6.57	6.57	7.04	7.19	7.30	6.24	6.35	6.47	6.54	7.01	7.06		
		7.22	7.27	7.34	7.49	8.00	7.00	7.07	7.15	7.22	7.28		7.31	7.35
7.35	7.54	7.57	7.57	8.04	8.19	8.30	7.30	7.38	7.45	7.52	7.59	8.02		
		8.46	9.03	9.11	9.19	9.30	8.00	8.08	8.15	8.22	8.29	8.32		
		9.48	10.03	10.11	10.19	10.30	8.30	8.38	8.45	8.52	8.59	9.02		
		10.48	11.03	11.11	11.19	11.30	9.30	9.37	9.45	9.52	9.59	10.02		
							10.30	10.37	10.45	10.52	10.59	11.02		
							11.30	11.37	11.45	11.52	11.59	12.02		

Light Face Figures A.M.

Dark Face Figures P.M.

*Coach begins at Beloit & Purdue Avenues.

#-To Stockton & Richmond Streets Only.

The financial picture for the entire A.C. Transit system is not good. In Fiscal Year 1972-73, A.C. Transit's operating costs exceeded farebox revenues by nearly 2 to 1. 4/ This year's picture reflects more of the same trend. Table C-8 shows cost-revenue summaries for the 12-year period from 1962-75. During the period, total revenue has increased approximately 34 percent while total operating cost has increased 127 percent. Thus, cost has increased nearly four times as rapidly as revenue over the last decade.

The largest cost increases are related to the wage increases of A.C. Transit employees. Table C-9 breaks down A.C. Transit's cost elements according to the District's accounting categories.

The overall financial outlook for A.C. Transit is bleak. If trends continue, revenues will decrease or remain about the same. 5/ As this memorandum was written, 1974-75 contract negotiations between the Amalgamated Transit Union and the District have not yet been concluded; however, a court ruling awarding back wages and settlement of current negotiations are expected to increase wage costs by more than 10 percent. Costs of fuel, parts, vehicles and construction are also likely to increase.

Although A.C. Transit's financial picture is bleak overall, the cost/revenue picture for Berkeley's portion of the system is in better shape. Table C-10 breaks down the revenue and cost statistics by individual routes serving Berkeley. Routes serving Berkeley generate 37 percent of systemwide revenue while producing 34 percent of A.C. Transit's total costs. Over one-third of A.C. Transit's revenue-producing ridership last year patronized routes serving Berkeley. Actually, Berkeley's own contribution to A.C. Transit is more significant, since Berkeley residents contributed the major proportion of patronage and revenue to routes serving the city, while the service of high loss local routes is provided primarily to areas outside the city.

4/ A.C. Transit's expenses including depreciation amounted to \$27,380,105 while revenues only amounted to \$16,511,064.

5/ This assumes some loss in patronage on A.C. Transit's top revenue Transbay routes when BART begins service from Oakland to San Francisco. Revenues are also expected to be limited by the effective 31.1 cents/\$100 ceiling on property taxes established by the passage of California State Bill 90.

Table C-8

TWELVE-YEAR FINANCIAL TREND
A.C. Transit Systemwide

<u>FISCAL YEAR ENDED JUNE 30</u>	<u>TOTAL REVENUE (in millions)</u>	<u>PERCENT CHANGE</u>	<u>TOTAL COST ^{1/} (in millions)</u>	<u>PERCENT CHANGE</u>	<u>REVENUE/ COST RATIO</u>
1962	\$ 12,321	---	\$ 11,409	---	1.04
1963	12,806	3.9	12,369	8.4	1.02
1964	13,233	3.3	12,900	4.3	1.01
1965	13,364	1.0	13,321	3.3	1.00
1966	14,126	5.7	14,416	8.2	0.98
1967	14,728	4.3	15,492	7.5	0.95
1968	15,182	3.1	16,594	7.1	0.92
1969	15,692	3.4	17,902	7.9	0.88
1970	15,969	2.8	18,407	2.8	0.87
1971	16,267	1.9	21,194	15.1	0.77
1972	16,271	0.0	23,331	10.0	0.70
1973	16,511	1.5	25,924	11.1	0.64
1974	18,116	9.7	32,779	26.4	0.55
1975 ^{2/}	15,198	-16.1	35,179	7.3	0.43

^{1/} Excluding Depreciation.

^{2/} Two-month long strike.

Table C-9

A.C. TRANSIT COST ELEMENTS

<u>EXPENSE ITEM</u>	<u>FISCAL YEAR ENDED:</u>		<u>PERCENT INCREASE</u>
	<u>1962</u>	<u>1973</u>	
	(in thousands)		
Maintenance	\$1,669	\$3,255	95
Transportation	7,194	16,464	128
Terminal and Shelters	63	127	100
Marketing	247	589	138
Insurance and Safety	666	1,016	53
Welfare and Pensions	410	2,204	438
Administration	589	1,253	113
Operating Taxes & Licensing	524	942	80
Operating Rents	<u>47</u>	<u>74</u>	<u>58</u>
TOTAL <u>1/</u>	\$11,409	\$25,924	127

1/ Excludes Depreciation

Table C-10
April, 1973

FINANCIAL CHARACTERISTICS OF A.C. TRANSIT ROUTES SERVING BERKELEY

<u>SERVICE</u>	<u>REVENUE</u>	<u>COST</u>	<u>SUBSIDY/ MILE (Cents/ Mile)</u>	<u>REVENUE/ COST</u>	<u>REVENUE PASSENGERS</u>	<u>REVENUE/ MILE (Cents/ Mile)</u>
<u>TRANSBAY ROUTES</u>						
E	\$ 362,578	\$ 388,882	6.28	0.93	769,909	86.52
F	1,381,542	1,217,195	-13.63	1.07	2,876,114	114.54
G	156,156	254,551	47.38	0.62	331,822	75.19
H	172,567	292,983	50.25	0.59	361,883	72.02
Sub-total	\$ 2,072,843	\$ 2,153,611	3.90	0.96	4,339,728	100.01
All A.C. Transit Transbay Routes	\$ 7,319,997	\$ 9,763,445	24.98	0.75	14,783,062	74.84
<u>EAST BAY EXPRESS</u>						
33	\$ 142,789	\$ 374,518	76.71	0.38	659,170	47.27
37	28,058	91,832	86.76	0.31	117,669	38.17
Sub-total	\$ 170,847	\$ 466,350	78.67	0.37	776,839	45.49
All A.C. Transit East Bay Express Routes	\$ 550,159	\$ 1,550,575	74.55	0.35	2,407,478	41.00
<u>EAST BAY LOCAL</u>						
7	\$ 103,909	\$ 371,419	80.21	0.28	538,476	31.13
15	464,268	1,003,533	66.70	0.46	2,275,359	57.37
17	12,572	98,125	156.09	0.13	62,130	22.92
40/43	1,114,835	1,933,107	45.35	0.58	5,131,817	61.73
51/58	1,044,328	1,545,899	37.99	0.68	4,961,728	78.46
65	57,544	222,368	105.10	0.26	281,915	36.21
67	80,413	307,953	78.36	0.26	450,908	27.67
72/73	584,823	1,245,280	58.45	0.47	2,422,038	51.71
88	253,149	485,462	59.92	0.52	1,292,925	65.24
Sub-total	\$ 3,715,841	\$ 7,213,146	67.38	0.51	17,417,296	71.60
All A.C. Transit Local Routes	\$ 7,198,346	\$16,745,456	64.86	0.43	33,531,933	48.90
TOTAL OF ROUTES SERVING BERKELEY	\$ 5,959,531	\$ 9,833,107	50.71	0.61	22,533,864	78.02
TOTAL OF ALL A.C. TRANSIT ROUTES	\$15,687,434	\$28,521,007	48.71	0.55	50,722,473	58.31

Management

The A.C. Transit District is governed by a 7-member Board of Directors, which is elected by the public. Two members (Chester McGuire and Ray Rinehart) are elected at large and five members are elected by specially defined Wards based on equal population. Mr. R. Nakadegawa represents Ward 1 which includes Berkeley.

The Board is supported by a management organization which includes 12 functional departments reporting directly to the District's General Manager, currently Mr. A. Bingham.

A.C. Transit employs in excess of 1,500 employees including approximately 1,261 drivers, 218 maintenance workers and 148 clerical employees. The Amalgamated Transit Union Division 192 represents these employees. The labor contract which expired in June, 1974 defines the basic wage rate of \$5.74 per hour for drivers and allows splits of 60 minutes or more in shifts over a 13-hour work spread.^{6/} A. C. Transit drivers are the highest paid bus drivers in the United States.

BAY AREA RAPID TRANSIT DISTRICT (BART)

Berkeley is served by five stations on the 34-station BART system. BART links Berkeley and the rest of the Bay Area with four lines that, when fully operational, will run on 71 miles of exclusive right-of-way.

The BART District was established in 1957 by enabling legislation and a favorable vote in San Francisco, Alameda and Contra Costa Counties. The BART Act has provisions for communities to join the District; however, communities now in the District are legally obligated to retire the debt they approved and, for all practical purposes, cannot withdraw.

^{6/} The new 3-year labor agreement gives drivers \$6.85 per hour effective immediately, \$7.07 per hour effective July 1975, and \$7.27 per hour effective July, 1976.

Service Characteristics

BART has not yet begun full service and its service characteristics, as the system moves toward full operation, will continue to be in flux for some time.

Coverage - The three Berkeley BART stations are within one-quarter mile walking distance of only eight percent of Berkeley residents. Parking is provided at the North Berkeley and Ashby stations (700 and 560 stalls, respectively), and one of these stations is within ten minutes drive from any part of Berkeley. A.C. Transit bus routes serve all three Berkeley BART stations, as shown in Table C-11.

Routes - BART ultimately intends to operate one East Bay and one transbay route through Berkeley. Currently Berkeley is served by one East Bay route running from Richmond to Fremont with a transfer connection at MacArthur station to the Concord Line.

Schedules - BART ultimately is planned to operate on 2-6 minute headways during peak hours once their train control system is "debugged" and they have sufficient rolling stock. Currently, it operates on a basic 12-minute headway. With such frequent service, BART does not plan on publishing a detailed train schedule, but instead intends to indicate train headways during different times of the day.

Hours of Service - BART currently operates from 6 a.m. to Midnight 7/ weekdays.

Fares - BART has a minimum 25-cent fare valid for short trips. Their fare matrix shown in Figure C-2 was developed based on distance and travel times. All local trips made within Berkeley or from Berkeley to downtown Oakland can be made for 30 cents. This complex fare structure is administered via an automatic fare collection system. Tickets are issued and inserted in fare collection machines in BART stations, although tickets

7/ Only Daly City-Concord and Richmond-Fremont lines operated after 8 p.m.

Table C-11

BERKELEY BART STATION CHARACTERISTICS

June, 1974

<u>STATION</u>	<u>TYPE</u>	<u>PARKING SPACES</u>	<u>A.C. TRANSIT FEEDER ROUTES</u>	<u>TICKET MACHINES</u>	<u>TURN- STILES</u>	<u>ESCA- LATORS</u> ^{1/}
Rockridge	Center Platform Elevated	816	17,51,58,E	2	3	1
Ashby	Center Platform Subway	560	15,17,43,65, 88,F,33,37	2	3	1 pair
Center Street	Center Platform Subway	None	F,7,15,40,43, 51,58,65,67, 33,37,Tilden Park	4	12	1 pair
North Berkeley	Center Platform Subway	700	H,43,51A,88, 65	2	6	1 pair
El Cerrito Plaza	Side Platform Elevated	509	51A,67,68,70, 78,72	2	3	1 rever- sible

^{1/} In addition, all stations have an elevator for use by the handicapped.

can also be obtained at local banks.^{8/}

Four types of machines confront the fare purchaser; a change machine, a ticket machine, an add-fare machine and the turnstile. The change machine provides the user with change for one dollar bills. They are located adjacent to all ticket and add-fare machines.

The ticket machine will allow the user to purchase a ticket with change, \$1 bills, \$5 bills, old tickets valued less than four dollars or combinations thereof. The ticket machine will not increase the value of an old BART ticket by less than 25 cents. The machine also does not give change. Ticket machines are only located outside of the turnstile area.

The add-fare machine will increase the value of the BART ticket if it is not valued enough for the ride. They are located only inside the turnstile area and will only increase the value of the old BART ticket the exact amount needed to exit the station. This can only be accomplished at the destination station.

Patrons can also pay 25 cents directly into the turnstile which will issue a ticket for that value.

Special fare tickets for senior citizens over 65 years of age and children under 12 are only available at local banks. Riders who qualify for these special discounts can purchase \$10 and \$20 valued tickets for \$2.50 and \$5.00, respectively. They are valid during all times of the day and are color coded red to minimize abuse of the privilege.

A round trip excursion fare is also available for \$1.00 which allows people to ride for up to three hours on the system and exit from the same station they entered.

Transfers - Transfers from the BART system to A.C. Transit are dispensed by a transfer machine in the paid area of the station, and are valid as a 25-cent fare for 90 minutes from the time of issue. There are no provisions for free transfer from local transit to BART, nor provisions

^{8/} At-station tickets valued from 25cents to 20 dollars may be bought at the BART stations, whereas only high valued \$10 and \$20 tickets may be purchased at local banks.

for a free "stop-on-the-way" interruption of travel in the same direction.

Schedule Adherence - BART intends to provide service every 2-6 minutes during peak hours, a frequency that minimizes the importance of schedule adherence. At the moment, however, there are some schedule problems associated with the high rate of vehicle and control malfunctions as BART "debugs" the system. There is not now, nor is there intended to be schedule coordination between BART, A.C. Transit or MUNI systems.

Load Factors - Standee loads occur now during peak periods on the Daly City-Concord line, on the Daly City-Fremont line and on central portions of the Richmond-Fremont line. During the period of partial transbay operation, crowding will be severe and Berkeley residents will be transferring to trains that are likely to be already crowded. Initially, travelers to San Francisco from Richmond, Berkeley, Oakland and Central Contra Costa County all will ride the Daly City-Concord line producing "crush loads". Several stations on the Daly City-Concord line are experiencing train dwell times of 60 seconds or more due to load-unload congestion. Although this problem has not effected Berkeley stations yet, the Center Street station has experienced congestion through the ticket gate areas.

Speeds - While BART trains can attain speeds of 80 miles per hour, the average travel speed is much lower because of the time lost at stations. Figure C-2 also shows the projected travel times between BART stations once the system is fully operational.

Physical Plant

BART's physical assets include a modern administrative building in Lake Merritt, modern maintenance yards at Richmond, Concord and Hayward, 34 stations, operating rights-of-way and rolling stock. Both the Richmond and Concord yards provide primarily running maintenance while the major maintenance is conducted at the main Hayward shops.

Cars - BART cars are 72 feet long and have doors automatically operated by the central train control (subject to manual override by the train operator). There is no on-board provision for carrying wheelchair passengers, packages or bicycles. Excepting for the grips on each seat and posts in the door area, standees do not have straps or hand holds. BART's 72 passenger cars can be combined in 2 to 10-car trains. Weather protected passages for moving between cars when the train is underway are provided.

BART currently has about 250 of its planned 450-car fleet available for revenue service. The availability of vehicles for revenue operation has been slowed both by BART not accepting delivery of vehicles and a high proportion of vehicles not in service due to malfunctions or breakdowns.

Stations - Five BART stations are commonly used as access points to Berkeley from external areas, El Cerrito Plaza, Rockridge, Ashby, Center Street Berkeley, and North Berkeley. The former two are located a short distance outside the Berkeley city limits.

BART is studying improvements to stations including: better signing to indicate train direction, connecting bus locations, the location of lifts for disabled persons, and the direction of nearby destinations; storage facilities and more and better located bicycle racks; platform indicators to show where the train doors will stop; closing gaps in the TV surveillance system and providing well-located and designed weather protection for people transferring from BART to local transit or waiting for a ride. Existing deficiencies in these areas were confirmed by our field reconnaissance.

Marketing

BART maintains an active market research and planning program to both improve and to sell their services. A majority of BART's current marketing efforts are focused at encouraging mid-day use, promoting purchase of high value tickets, educating the public to use the system and disseminating fare and feeder bus information.

Market profile information is also gathered annually via an on-board survey.

Financing

Since BART has not been operating revenue service very long and full revenue service has yet to be accomplished, it is difficult to assess BART's revenue and cost trends. Their 1972-73 Annual Report indicates operating revenues of \$2,103,621 and operating expenses of \$8,311,007. Thus, BART covered 25 percent of their operating expenses with operating revenues. This ratio is anticipated to improve with the decreased costs associated with start-up of service. The proportion of wage costs to total operating costs was almost 80 percent.

BART's enabling legislation did not provide a permanent taxation authority to subsidize operating deficits. A temporary extension of BART's one-half-cent sales tax expires in 1977, leaving BART financially stranded. Legislations is pending on the State level to deal with this problem.

Management

The BART District is currently governed by a 9-member elected Board. Two of the nine BART Districts are in Contra Costa County, four others are in Alameda County, and the remaining three are in San Francisco. Berkeley is in District 3 which includes Berkeley, Albany, Emeryville, Piedmont and North Oakland.

BARTD's management structure includes 5 functional departments under the direction of a General Manager. An assistant General Manager for operating coordinates ten other functional departments. The five departments which report directly to the General Manager are:

- . Budget Planning and Research
- . Marketing and Communications
- . Personnel and Community Development
- . Employee Relations
- . Special Services

Frank Herringer, Jr. is currently BARTD General Manager.

BART employs approximately 1,700 persons, including 113 train operators and 560 maintenance workers. The train operators belong to the Amalgamated Transit Union while the maintenance and clerical employees are represented by the United Public Employee Local 390. Supervisory employees are not unionized. An independent labor organization, the BART Police Officer Association, represents members of BART's security force.

UNIFIED SCHOOL DISTRICT

The Berkeley Unified School District provides school transportation to children in kindergarten through sixth grade.

Warrants for school bus service are three-quarters of a mile coverage for kindergarten through third grade students, one mile for fourth grade through sixth grade students and a mile-and-a-half for secondary school students. Berkeley buses carry approximately 5,200 students per school day to 23 schools. Ridership is comprised of about 3,500 kindergarten and primary school students, 425 early childhood pre-schoolers, 140 special students, and 1,000-1,200 field trip students. Eleven kindergarten through third grade schools, four fourth through sixth grade schools, five pre-schools, two special kindergarten and one secondary school are served. The service to the secondary school is for special need students.

Children in the seventh through twelfth grades must either walk, bike, ride A.C. Transit or be driven by their parents. Some of the older students also drive to school. Students who ride A.C. Transit must pay 15 cents each ride either in cash (exact fare) or in tickets sold at secondary school offices in units of 10.

Service Characteristics

School bus service is provided in a one-way direction on most Berkeley streets. While the service is generally very indirect and circuitous, it is typical of most school bus service which have a captive market.

A review of the hours of service indicates relatively steady usage of vehicles from 8 a.m. to 4 p.m. on school days. School hours are staggered by grades and this facilitates better utilization of vehicles (Table C-12).

Table C-12

BERKELEY SCHOOL DISTRICT SCHOOL HOURS

	<u>SCHOOL HOURS</u>
A.M. Kindergarten	9:00 a.m. - Noon
P.M. Kindergarten	12:20 p.m. - 3:20 p.m.
Grades 1-3, Section A	9:00 a.m. - 2:10 p.m.
Grades 1-3, Section B	10:10 a.m. - 3:20 p.m.
Grades 4-6	8:30 a.m. - 2:40 p.m.

Physical Plant

Transportation services for the Unified School District are based at 801 Parker Street in West Berkeley. Both the administrative building and the maintenance building are situated on this property which is about 72,000 square feet. The maintenance facility is modern, has two hydraulic lifts and appears well organized. This facility services the 37 buses described in Table C-13. On the average, buses in the fleet are less than four years old and have a passenger capacity for 67 students. The fleet ranges in size from 12-passenger vehicles up to 91-passenger vehicles. The most common sizes are 66-and 79-passenger vehicles which comprise nearly three-fourths of the fleet.

In addition to the regular school fleet, the Berkeley Unified School District owns nine special purpose vehicles. These vehicles include

Table C-13

BERKELEY UNIFIED SCHOOL DISTRICT VEHICLE INVENTORY

<u>DISTRICT VEHICLE NUMBER</u>	<u>YEAR</u>	<u>MAKE</u>	<u>MODEL DESCRIP- TION</u>	<u>LICENSE</u>	<u>SERIAL NUMBER</u>
1	1965	Inter- national	36-pass. Bus	E180652	SB51866- 4E
2 <u>1/</u>	1971	Ford	66-pass. Bus	E586455	J70VVL1- 0844
3	1966	Inter- national	48-pass. Bus	E191297	416350H- 621747
4	1966	Inter- national	48-pass. Bus	E193912	416360H- 6380556
5	1966	Ford	66-pass. Bus	E193548	B70DU86- 5422
6	1966	Ford	66-pass. Bus	E193913	B70DU86- 5423
7	1973	Gillig	79-pass. Bus	E608377	E1447
8 <u>1/</u>	1972	Ford	66-pass. Bus	E600233	J70VVN3- 2810
9	1956	Chevrolet	16-pass. Bus	E521684	3G56N02- 0710
10 <u>1/</u>	1972	Gillig	79-pass. Bus	E594335	E0875
11 <u>1/</u>	1971	Ford	66-pass. Bus	E592611	J70VVL1- 0836
12	1966	Ford	12-pass. Bus	E191881	E16AH88- 6924
13 <u>1/</u>	1972	Ford	66-pass. Bus	E600235	J70VVN3- 2813

Table C-13

(Continued)

<u>DISTRICT VEHICLE NUMBER</u>	<u>YEAR</u>	<u>MAKE</u>	<u>MODEL DESCRIP- TION</u>	<u>LICENSE</u>	<u>SERIAL NUMBER</u>
14	1972	Chevrolet	16-pass. Bus	E572715	CGE362U- 110985
15	1969	Ford	36-pass. Bus	E597508	850CLE1- 7405
16 <u>1/</u>	1972	Ford	66-pass. Bus	E600232	J70VVN3- 2815
17 <u>1/</u>	1972	Ford	66-pass. Bus	E600236	J70VVN3- 2815
18 <u>1/</u>	1972	Ford	66-pass. Bus	E600234	J70VVN7- 6322
19 <u>1/</u>	1972	Ford	66-pass. Bus	E602389	J70VVP5- 6503
20 <u>1/</u>	1972	Ford	66-pass. Bus	E602388	J706VVP- 56504
21 <u>1/</u>	1972	Ford	66-pass. Bus	E602386	J70VVP5- 6502
22 <u>1/</u>	1972	Ford	66-pass. Bus	E602387	J70VVP5- 6498
23 <u>1/</u>	1972	Gillig	79-pass. Bus	E601102	TE 0563
24 <u>1/</u>	1972	Gillig	79-pass. Bus	E601823	E 0564
25 <u>1/</u>	1972	Gillig	79-pass. Bus	E601656	E 0565
26 <u>1/</u>	1972	Gillig	79-pass. Bus	E602987	E 0566

Table C-13

(Continued)

<u>DISTRICT VEHICLE NUMBER</u>	<u>YEAR</u>	<u>MAKE</u>	<u>MODEL DESCRIP- TION</u>	<u>LICENSE</u>	<u>SERIAL NUMBER</u>
27 <u>1</u> /	1972	Gillig	79-pass. Bus	E601103	TE 1077
28 <u>1</u> /	1972	Gillig	79-pass. Bus	E601429	E 1078
29 <u>1</u> /	1972	Gillig	79-pass. Bus	E601657	E 1079
30 <u>1</u> /	1972	Gillig	79-pass. Bus	E601428	E 1080
31 <u>1</u> /	1972	Gillig	79-pass. Bus	E601658	E 1081
32 <u>1</u> /	1972	Gillig	79-pass. Bus	E601824	E 1082
33 <u>1</u> /	1972	Gillig	79-pass. Bus	E602986	E 1239 1
34 <u>1</u> /	1972	Gillig	79-pass. Bus	E602985	E 1239 2
35 <u>1</u> /	1972	Gillig	91-pass. Bus	E602714	E 1240 1
36 <u>1</u> /	1972	Gillig	91-pass. Bus	E602868	E 1240 2
37	1973	Ford	16-pass. Bus	E617807	35GHR52- 653
38					
39					
40	1970	Mercury	Sedan	E559075	OZ44K57- 6137

Table C-13

(Continued)

<u>DISTRICT VEHICLE NUMBER</u>	<u>YEAR</u>	<u>MAKE</u>	<u>MODEL DESCRIP- TION</u>	<u>LICENSE</u>	<u>SERIAL NUMBER</u>
41	1966	Inter- national Van	Van	E191414	550808L- 008784
42	1969	Ford	Van Display	E528235	E16GDH8- 4253
43	1971	Chevrolet	Sedan	E573082	154691C- 126422
44	1970	Ford	Sedan	E559069	OJ54H15- 1810
45	1965	Buick	Station Wagon	E559861	4445552- 114888
46	1970	Plymouth	Station Wagon	E559074	PL46GOD- 193140
47	1970	Plymouth	Sedan	E559072	RL41GOA- 194280
48	1970	Plymouth	Sedan	E559070	RL41GOA- 99224

1/ Diesel Powered Vehicles.

sedans, station wagons, and vans from four to nine years old used for special programs. The District also possesses a 1962 tow truck, a 1974 half-ton service truck and two 1970 supervisor cars.

Financing

For the last fiscal year for which financial data was available, 1971-1972, the Berkeley Unified School District supported a total bus operation expenditure of \$458,452.71. At this time, 32 buses were used to provide the service. Twenty-two of these 32 buses were owned by contractors.

Management

School transportation is managed by Mr. J.M. Bradford for the Unified School District. He reports directly to the elected Board of Education which is independent from the City of Berkeley.

Approximately 42 persons are employed by the Unified School District; 31 drivers, 4 maintenance men, 2 road supervisors, 1 driver trainer, 1 dispatcher, 1 contract dispatcher and 2 secretaries. Starting salaries for drivers are \$4.76 per hour which is about two-thirds of A.C. Transit's drivers wages. Overtime must be paid to Unified School District employees after 37-and-a-half hours per week.

TAXI CABS

Yellow Cab, Taxi Unlimited, Arrow and Rainbow Taxi companies provide service for Berkeley. These companies provide door-to-door service in Berkeley and to nearby East Bay destinations. Rates vary from \$1.60 to \$1.30 for the first mile and .80¢ to .70¢/mile thereafter; thus, taxis have considerably higher fares than other public transportation serving Berkeley. Nonetheless, the taxi companies' own observations indicate that blacks, females, the elderly, heavy drinkers and the handicapped are frequent taxi users, in addition to the wealthy and visitors to Berkeley. Everybody uses a taxi at sometime or another, especially in emergencies.

There is an understandable lack of general information regarding who travels by taxi and where they are going; thus, other information about

taxi operations that might aid competitors or assist improvements to public transportation that infringe upon customers has not and will not be volunteered by taxi companies. However, it is recommended that basic information be obtained from the taxi companies as a prerequisite to licensing or requests for rate hikes.

Service Characteristics

These four companies are the only ones allowed by license to pick-up passengers in Berkeley, although other companies in the Bay Area can drop-off in Berkeley after picking up outside the city. The four companies combined have 45 taxi cab permits. The permit is for the vehicle itself, which can be driven by more than one driver. During the daytime, Yellow Cab may have 5 to 10 cabs in Berkeley; Arrow up to 10; Taxi Unlimited 4 and Rainbow 1 or 2. Table C-14 shows the service characteristics of the four companies.

Technically, Oakland Yellow Cab is allowed to have only a designated few of its 150 cabs picking up fares in Berkeley, but in practice any of its cabs can pick-up in Berkeley. Yellow Cab has not abused this privilege since Berkeley is a relatively weak taxi area compared to Oakland. This relative market weakness of Berkeley is due to the scarcity of bars; the traffic congestion, and lack of freeways near the chief attractors; the abundance of cost conscious students and other young people who will walk, use a bus or BART before engaging a cab, and the high rents which drive the car poor blacks and elderly to Oakland.

With the exception of Rainbow Taxi, all the cabs are radio dispatched. Typically, these companies dispatch a taxi within 5 to 10 minutes of receipt of the customers telephone request; although, during periods of heavy demand- rush hour, transit strikes, rainy weather- service can be delayed up to a half hour or more.

The time for the taxi to arrive at the customer's door is usually 10 to 25 minutes and sometimes longer.

All four companies can transport you as far as you want to go, although they exercise some judgement during busy periods over the desirability of dispatching long trips when more short trips will return higher total fares. All four companies offer 24-hour service.

Table C-14

TAXI SERVICE CHARACTERISTICS

June, 1974

	COMPANY			
	<u>Yellow Cab</u>	<u>Taxi Unlimited</u>	<u>Arrow</u>	<u>Rainbow</u>
Operating Hours	24	24	24	24
Five can share ride for the price of one?	Yes	Yes	Yes	Yes
Insurance, bond	Own Insurer	Insurance	Won't say	Bond?
City Subsidy	None	None	None	None
Operating Area	Oakland, Berkeley, Alameda, Albany, Emeryville, Piedmont, Kensington	Albany, Emeryville, Berkeley, El Cerrito, Kensington	Albany, Berkeley, Emeryville	Albany, Berkeley, El Cerrito, Emeryville
Number of Cabs?	150	4	10	2 (usually only 1 operating)
Radio Dispatched?	Yes	Yes	Yes	No
Rates	\$.80 drop .80 mile (\$1.60 1st mile)	\$.60 drop .70 mile (\$1.30 1st mile) (10¢ 1/7 mile)	\$.80 drop \$.80 mile \$1.60 1st mile)	\$.70 drop \$.70 mile
Peak Hours	Friday & Saturday nights (bars in Oakland)	Daytime, Weekdays (groceries)	Early mornings, evening rush, late at night	Friday and Saturday nights
Phone Business	80-90%	90%	Very large	
Owner	Same company as Yellow Cab in San Francisco & Los Angeles	Local	Local	Local

Patronage

Frequent trip attractors are bars, night clubs, long distance transportation facilities (especially with luggage), hotels, hospitals and medical facilities, shopping (especially with packages), Golden Gate Fields and Churches on Sunday. Pacific Telephone pays for taxis for their operators on the late night shifts. School children also use taxis especially from some private schools. College students tend not to use taxis for trips other than to airports, to interstate bus terminals, and to the Airport Transit Service at the Durant Hotel.

The elderly, even though they may be physically able to ride a bus, generally prefer to take a taxi, some because of the status but more because of the personal contact with the driver rather than the less personal driver contact on buses.

Peak activity periods for taxis generally are Friday and Saturday nights. Other evening periods when crime is high and when bus service is less frequent, also are very active periods for taxi usage. Holidays and late morning periods are generally poor taxi usage times. Taxi Unlimited reports that their busiest times are during the afternoons on weekdays.

The taxi operators are required by law to keep a waybill, a record of all trips for possible use by the police.

Fares

As indicated above, the basic fare structure which has a base set by the City of Berkeley for taxi companies picking up within the city was \$1.30 for the first mile or 60¢ for the drop of the flag and 70¢ a mile at 1/7-mile increments (\$1.30 for the 1st mile). However, Yellow Cab which works out of Oakland has since completion of the studies analysis in 1974 raised their fares to \$1.80 for the first mile and 90 cents per additional mile.

General experience indicates that during slack periods and partly subject to the whims and friendships of the driver, or dispatcher, taxis can be obtained for a lower "flat rate" or negotiated for. Flat rates can be as little as one-half of meter rates, depending on the negotiating relation-

ship between the potential passenger and taxi driver, and the length of trip and demand for taxis at the time. This practice is not strictly in accord with the multitude of regulations governing taxi operations in California. In fact, taxis operating "dead-head" with their meters out of service, but with passengers are technically "high-flagging" in violation of Ordinance #2800, Sections 7.15 and 7.16 of the City of Berkeley code. This ordinance is intended to alert the police to possible kidnapping of taxis in conjunction with robbery or other crimes, and incidentally insures taxi companies an accurate correspondence between trips and revenue. It is similar to ordinances in other municipalities.

Naturally, this practice is difficult to enforce; therefore, information as to how wide-spread flat rate trips are in Berkeley is not available.

The smaller companies are more likely to allow flat rates than Yellow Cab which has more strict supervision.

Marketing

The taxi companies all primarily advertise in the telephone book and on the cabs themselves. "Yellow Cab" is a common name nationally, but they are separate companies. Yellow Cab of Oakland serves Berkeley (as well as Alameda, Piedmont, Emeryville and Albany) and it is a branch of the same company that owns Yellow Cab in San Francisco and in Los Angeles.

The taxi companies do not market a detailed description of their fares, rates or services and so one has to question the operator or dispatcher.

Financing and Management

Little is known about the financial status or management of the taxi companies. The companies are profit making enterprises, but they are exempt from filing with the California State Public Utilities Commission and are subject solely to local control and regulation.

There is no annual financial statement required and thus the only time the City gains access to this type of information is when the companies request a rate hike.

SPECIAL TRANSPORTATION SERVICES

Several public transportation services in Berkeley serve special needs. The largest special service is to the University of California.

There are also transportation services for the disabled, medical trips for the needy, food delivery for the aged, and a pick-up service for the disabled community health clinic at Herrick Hospital.

Campus Buses

Two types of public transit service are offered by the University of California; shuttle services and inter-campus transportation. The shuttle services are the most heavily used and the most important to the Berkeley community. Three free shuttle services are provided at the University: a BART shuttle, Richmond Field Station shuttle and a Lawrence Berkeley Laboratory shuttle. The BART shuttle, operated by the University Student Association, ASUC, has an express route and a local route.

The local route operates from the Center Street BART station (corner of East Shattuck and Center Street) and goes to the Hearst Mining Circle via the West Campus portal, and Haviland Road. The express route also originates at the Center Street BART station operating closed door to the Hearst Mining Circle and then open door to the Hall of Science Building via East Gate, Gayley Road, Stadium Road and North Canyon Road. Service is provided from 7 a.m. to 9:30 p.m. Monday through Friday all year. The local route operates with 5- and 7½-minute headways during the peak (7-9 a.m., 11 a.m.-1 p.m., and 4:30-6:00 p.m.) and off-peak periods, respectively. The express route operates on 15-minute and 30-minute headways during the peak and off-peak hours, respectively. Both routes are very successful carrying in excess of 2,500 total passengers in a single day during the summer school session. The express route occasionally overloads when a large group travels together to or from the Hall of Science.

Two new night shuttle routes have recently been introduced Monday through Thursday night from 7:00 p.m. to 2:00 a.m. One route, the "Channing Circle/Unit I and II", will serve the residential areas above Telegraph (east of Telegraph). The other route will alternately service Northside and Southside/Unit III; the area below Telegraph (west of Telegraph).

The Richmond Field Station bus is available only to University of California students and employees. The Richmond Field Station bus runs from 7:30 a.m. to 5:30 p.m. with hourly runs from 8:30 a.m. to 3:40 p.m. It starts at the Hearst Mining Circle and goes by the Center Street BART station, and goes by the University Village in Albany.

The Lawrence Berkeley Laboratories, otherwise known as the Radiation Lab, runs buses between the Berkeley BART station and the Bevatron Circle in the Radiation Lab. There are two buses during the rush hour which leave every ten minutes, starting at 7 a.m. to 9 a.m. and again from 4:10 p.m. to 6:10 p.m. which is the last bus down the hill. The route goes down Hearst and over Oxford to Center Street and back the same way. During the midday, from 9 a.m. to 4 p.m. only one bus is operated. It runs every 20 minutes from the Lawrence Berkeley Laboratory down Hearst to Gayley Road to Bancroft to Kittredge to Shattuck and the BART station continuing to Center Street, Oxford and Hearst back to the Lab.

The buses are free to users and visitors of the Lab. The school type vehicles have bike racks on the front. Gateway Bus Lines operates the buses for the Lab. Funding is by the Lawrence Lab and thus indirectly by the Federal Government.

Special daily bus services to the Berkeley Campus are provided by both the Davis and the Santa Cruz campuses. Both services are restricted to University employees and students only.

TRANSPORTATION FOR THE DISABLED

The Center for Independent Living provides transportation for any disabled person within its target area of Berkeley, Albany and North Oakland. At the time of the study's inventory, they operated two vehicles equipped to transport wheelchairs. Since then, they have expanded their fleet to five vehicles. The service is free, however, they will accept donations from those who can afford it, to help support the service. Since there is more demand than capacity, the trips are scheduled according to a priority: medical trips first, then dental, then legal, then only occasionally can they squeeze in shopping trips. Trips must be requested 24 hours in advance and operates only during the weekdays. The driver will assist the person down one step at their home, and push the wheelchair up the ramp onto the bus, but that is all because of the insurance problem.

The funding comes mostly from Alameda County, the City of Berkeley and the San Francisco Foundation.

There are about 300 motorized wheelchair people in Berkeley, mostly young. Most of them could use a bus if there was a lift to get on and off the bus - and a place to put the wheelchair.

There is no other alternative public system for disabled persons. Taxi cabs are reluctant to take wheelchair people for insurance reasons. The fully insured Medicab or Ambucab is very expensive, on the order of \$11.00 for a trip.

Red Cross

The Red Cross operates two station wagons between 8 a.m. to 4:30 p.m. on weekdays. Their services are strictly for medical help for the indigent, and are staffed completely by volunteers. Their funding has been cut so their service is down from the six cars they had several years ago to only 2 vehicles. Currently, they have 15 drivers who volunteer various amounts of time during the week. This is not quite enough, especially during the summer when some trips have to be cancelled for lack of a driver.

Most of their clients are referred by social service agencies, such as hospitals, the Cancer Society and the East Bay Blind Center. Priority, however, is given to people related to the armed forces. They make several trips a week out to Oaknoll Naval Hospital in East Oakland. Also, they take people occasionally to work at the induction center canteen located at 15th & Clay in Oakland. They are not allowed to take people in wheelchairs.

Red Cross receives United Crusade funds.

Herrick Hospital

Herrick Hospital has three vans which are paid for and run by hospital funds. The vans are for in-patient services and recreation except for the every other week Disabled Community Health Clinic. The clinic serves 15-20 out-patients of which 75 percent are delivered by the van.

The clinic is funded by the United Bay Area Crusade. Their van has a hydrolic lift to facilitate use by people confined to wheelchairs.

School District

The Berkeley Unified School District has special small school buses for transporting handicapped and retarded children to their special programs.

Senior Citizens Center

Both the Senior Citizens Center on University Avenue and the Model Cities Senior Citizens Project at the Magee Avenue Baptist Church on Stuart Street each have a van to transport their members to and from the centers. The centers serve hot meals to those who can come to the centers. The vans are also used to take meals out to the shut-ins, especially from the Model Cities Project.

The City of Berkeley is the agency in charge of both centers, though the Model Cities program is primarily federally funded.

The Senior Citizens Center's bus is run by volunteers, whereas the Model Cities project has a paid driver.

INTRASTATE PUBLIC TRANSPORTATION SERVICE

Three types of intrastate public transportation serve the Berkeley community; rail, bus and air.

Rail

Passenger rail service is provided by Amtrak from their Oakland terminal at Sixteenth and Wood Street. Amtrak currently operates 28 train departures per week from Oakland, up from 13 a year ago. Table C-15 shows Amtrak's current schedule.

Table C-15

AMTRAK SERVICE

DESTINATIONLEAVES OAKLAND DAILY AT:

Seattle

8:40 p.m.

Chicago

9:20 a.m.

Los Angeles

8:15 a.m.

Bakersfield

10:00 a.m.

A.C. Transit provides service via their 88 routes from Berkeley to Amtrak's Oakland 14th Street station during hours of scheduled Amtrak service.

Prior to the time that Amtrak assumed operation of rail passenger service on May 1, 1971, Southern Pacific stopped its passenger trains in Berkeley and Richmond. Some people have suggested the reintroduction of the stops. The Southern Pacific tracks in Richmond pass next to the Richmond BART station, and this is the site of the old Southern Pacific station. Reintroduction of the stop for Amtrak trains would provide excellent BART access to Amtrak from Berkeley (and the rest of the East Bay). This connection would take on added significance if intercity rail service is started between the Bay Area and Sacramento. The San Francisco Bay Area, Sacramento, Stockton Corridor Study has recommended that frequent high-speed Bay Area to Sacramento Corridor train service be started from the Richmond BART station on the Southern Pacific tracks to Sacramento.

Bus

Two carriers, Greyhound West and Continental Trailways, provide service to Berkeley from their Oakland facilities. Direct services are provided to Greyhound's Oakland Terminal by A.C. Transit's 72 route and to Trailway's Oakland Terminal by A.C. Transit's 40/43 route. Both of these

A.C. Transit routes operate on frequent headways. These terminals are also within walking distance of BART's Oakland 19th Street station. Trailways also stops at 23rd Street in Richmond and the Greyhound local to Vallejo goes down San Pablo Avenue and stops at University and San Pablo about every three hours.

Air

Berkeley is serviced by both the Oakland and the San Francisco Airports. Access to the San Francisco International Airport is via SFO helicopter or by A.C. Transit/BART to MUNI to Greyhound (Seventh Street)/Airporter (Union Square). The latter is very time consuming and requires two transfers and three fares. San Mateo County plans to initiate bus service from the Daly City BART station to the airport in which will allow Berkeley residents to make the trip quickly via BART and San Mateo County Bus.

Helicopter service to San Francisco International Airport is provided from Emeryville. No direct bus service, however, is available between SFO Helicopter's Emeryville station and Berkeley.

Two carriers, A.C. Transit and Airport Transit, provide public transportation between Berkeley and the Metropolitan Oakland International Airport. Travelers using A.C. Transit's 57 route must transfer to BART at the Coliseum station to reach Berkeley, or ride the 57 through Oakland to transfer to the 51 at Berkeley, the 40/43 at Telegraph, the 88 at Market, the 15 at Grove, or the 72 at San Pablo.

Airport Transit operates two 15-passenger (also some large buses) buses equipped to carry luggage from the Durant Hotel on Telegraph Avenue in Berkeley. The service is provided on hourly headways, at a \$2.50 one-way fare and a 40-minute travel time. Airport Transit's operating day extends from 6 a.m. to 10 p.m. Numerous A.C. Transit routes serve the Durant Hotel including the 40, 43 and 51. Airport Transit also operates three times a day from the Trailways terminal in Oakland at Telegraph and 20th to the San Francisco International Airport at 7 a.m., 2:45 p.m. and 7:55 p.m. at a cost of \$1.25.

PURPOSE

The Berkeley Transit Project assessed the patronage potential of local transit improvements for Berkeley. The purpose of the work were:

- 1) To give a general indication of the benefit of improved local transit to Berkeley residents.
- 2) To anticipate the increase in transit revenues and costs associated with improved local service, so that the operating deficit for a five year program could be estimated.

The Project did not attempt a detailed or long range patronage estimate, believing that the factors determining patronage, such as fuel costs and street congestion, are fundamentally unpredictable in the long term. Instead, a short range assessment of potential transit ridership was made, and the service improvement program was designed so that it could be flexible to respond to ridership increases as they occur.

APPROACH

Since Berkeley is a stable community and has experienced little change in overall travel characteristics in the last decade, the Berkeley Transit Project saw little merit in trying to forecast future travel demand. 1) Rather, after an investigation to make sure that no major housing project or commercial development was pending that might change travel patterns, the Project used information on existing travel, and attempted to determine how much transit's share of a stable travel market could be increased. 2)

The ridership estimates used information from the Regional Transit Travel Projection Project (RTTPP), the Bay Area Transportation Study (BATS) and the Neighborhood Traffic Study, augmented by the Project's own survey of community travel characteristics, data obtained from the University of California describing Campus generated travel, and information obtained from a variety of employers and community service agencies in Berkeley.

This information was not entirely consistent because it came from a variety of sources. The Project synthesized its own trip table by adjusting RTTPP and Neighborhood Traffic Study data to more closely reflect the actual distribution of jobs, population and trip generating activities in Berkeley.

The level of Service provided by the existing transit system and by each of the alternative proposals was described for representative trips by indicating walking, waiting, riding and transfer times. Travel times by automobile and walking were calculated for the same representative trips in order to describe transit's competitiveness in the travel market.

A form of the N. Dimensional Logit Model was used to assess the ridership potential of the recommended proposal. The Model was developed for the San Diego Comprehensive Planning Organization, and was calibrated in the Bay Area and Boston. 3) It was selected by the Berkeley Transit Project because it had been specifically designed to determine peoples responsiveness to better transit service without a massive data collection effort.

ORGANIZATION

The following sections of this report describe the major parts of the work to estimate transit ridership potential; Describing Berkeley's Travel Patterns, the Method of Estimation, and the Results.

BERKELEY TRAVEL PATTERNS

ANAYLTICAL FRAMEWORK

Berkeley was divided into 71 TRANSIT ANALYSIS ZONES for the purpose of evaluating ridership potential (Figure 1). These zones were selected so they could be grouped into neighborhood areas (Figure 2), or aggregated to correspond generally with RTTPP 290 Zone System boundaries.

Information was analysed simultaneously at three levels:

- 1) TRANSIT ANALYSIS ZONE LEVEL -- Population, employment and activity characteristics were mapped according to their actual location and were used to determine trip production and attraction for each Transit Analysis Zone.
 - a) The City of Berkeley Planning Department had surveyed the 1970 population in each U.S. Census Block. The Berkeley Transit Project determined the population of each Transit Analysis Zone by aggregating this block information.
 - b) The employment and clientele of business and community services in Berkeley were estimated by surveying these activities. The Project distributed questionnaires and contacted major Berkeley activities to ask them how many people they employed and, on the average, how many visitors or customers came to their establishment daily. 4) The questionnaire was augmented by a "wind-shield survey" of shopping districts in Berkeley. The results of both surveys were an estimate of the total clientele and employment in each Traffic Analysis Zone.
 - c) The University of California annual survey of student residence location was reviewed on a 10% sample basis, and the results summarized by Zone.
- 2) NEIGHBORHOOD LEVEL -- Profiles of socio-economic characteristics significant to transit ridership were compiled for each of twenty-one Berkeley neighborhoods. 5) So that

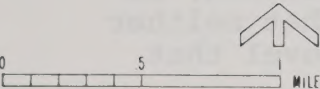
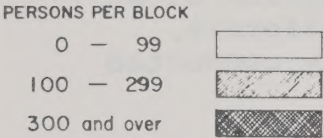
FIGURE D-1
TRANSIT ZONES



0 01 02 03 04 05



**FIGURE D-2
NEIGHBORHOOD
POPULATION
DISTRIBUTION**



transit ridership potential could be discussed in a meaningful way, the levels of service for the existing transit system and for each proposal for improved transit were also described at this level.

- 3) RTTPP 290 ZONE LEVEL -- External travel information was compiled using the 290 Zone System, with the exception of a U.S. Postal Zip Code sort of University of California, Berkeley Faculty and Staff which the University conducted for the project.

PREVIOUS STUDIES

Travel patterns in Berkeley were reassessed recently by the RTTPP and the Neighborhood Traffic Study.

Regional Transit Travel Projection Project

In 1965 BATS conducted a home interview on a sample basis throughout the Bay Area and expanded the results into a general description of regional travel characteristics. The original sample was expanded again using 1970 U.S. Census information to produce a revised picture of regional travel.

There were some significant differences between the pictures of Berkeley travel produced by BATS and RTTPP.

- . As one might expect, RTTPP estimated more travel to and from Berkeley than did BATS.
- . RTTPP generally concluded that a shift in travel had occurred since BATS, and that a greater proportion of trips to Berkeley were now coming from western Contra Costa County, instead of the Warren Freeway Corridor.
- . There were some differences between the BATS and RTTPP estimates of travel within Berkeley. However, it became apparent when the Berkeley Transit Project surveyed actual population, employment and activity distributions in Berkeley that neither BATS nor RTTPP provided a description of local travel that was sufficiently detailed for use by the Project.

Neighborhood Traffic Study

The Neighborhood Traffic Study developed a local trip table for Berkeley, using a "gravity model" method that the consultant for the Study had adapted from prior work on Palo Alto, California. 7) The trip table excluded walking and bicycle trips.

Use of Previous Studies

The Berkeley Transit Project used the RTTPP estimates to describe travel to and from Berkeley, with the exception of travel generated by the University of California and the West Berkeley Industrial area. The Project surveyed these two major trip generators independently, and concluded that RTTPP had underreported them. The RTTPP data was apportioned to Berkeley Transit Zones on the basis of their population and employment. The Neighborhood Traffic Study trip table was reallocated to Transit Analysis Zones also on the basis of their population and employment distribution.

ADJUSTED TRAVEL ESTIMATES

Both local and external travel estimates were adjusted by the Berkeley Transit Project, using the approach described above. The adjusted TRIP TABLES were then used to estimate transit ridership potential.

General Travel Characteristics

Table 1 summarizes the adjusted travel information used by the Berkeley Transit Project.

- . The Project's estimate for total daily travel generated by Berkeley is about three percent higher than the figure used by the Neighborhood Traffic Study.
- . Estimated trips by non-residents into Berkeley are higher than RTTPP figures roughly corresponding to the greater number of trips generated by the University of California and the West Berkeley Industrial area, as surveyed by the Project.

TABLE 1
SUMMARY OF BERKELEY TRAVEL PATTERNS¹⁾

	<u>TOTAL</u>	<u>AUTOMOBILE</u>	<u>TRANSIT</u>	<u>OTHER</u> ²⁾
Daily Trips	766,000	489,000	48,000	121,000
To Berkeley	175,000	162,000	13,000	-
From Berkeley	166,000	143,000	23,000	-
Local Trips	317,000	184,000	12,000	121,000
Through Berkeley	108,000	N/A	N/A	N/A

Notes:

- 1) One-way person-trips on an average week day in 1972-1973.
- 2) TOTAL TRIPS are estimated from RTTPP and adjusted as described in the text of this report. Transit ridership was estimated by reviewing BATS data, revenue/ticket data from AC Transit and BART.

- Total internal trips are comparable to Neighborhood Traffic Study estimates, although the adjustment and allocation of the Traffic Study data to Traffic Analysis Zones resulted in roughly 20,000 more automobile/transit trips and correspondingly less walking/bicycle trips.

External Travel

Figure 3 summarize RTTPP external travel desires. 6) For the purposes of assessing ridership potential, the Project estimated that the University of California generates more trips than the RTTPP estimates, about 100,000 trips on an average week day during the school year. Roughly 50,000 of these trips were estimated to originate outside Berkeley, assuming that a complete survey of student residence locations would substantiate the partial survey conclusion that 33 percent of the student population live outside Berkeley, using the Zip Code distribution of Campus Faculty and Staff, and assuming that most service and visitor trips to Campus are from outside Berkeley.

Local Trips

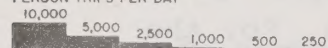
Figure 4 and Table 2 describes the Adjusted Internal Trip Table, expressing major local travel demands between Berkeley neighborhoods, shopping districts, the campus and other significant local destinations.

METHOD OF ESTIMATING RIDERSHIP

The N. Dimensional Logit Model was developed to estimate transit patronage increases corresponding to improvements in transit service in the San Diego area. Application of the model to Boston and San Francisco metropolitan areas was tested by San Diego's Comprehensive Planning Organizations' consultant and found to accurately estimate trips in those regions without special calibration.

FIGURE D-3
INTERNAL
TRAVEL DESIRES
CITY OF BERKELEY

PERSON TRIPS PER DAY



TRIPS UNDER 250 NOT SHOWN

LEGEND

ZONE NUMBER

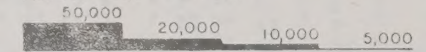
ZONE BOUNDARY

20



**FIGURE D-4
EXTERNAL TRAVEL DESIRES
CITY OF BERKELEY**

PERSON TRIPS PER DAY



TRIPS UNDER 5,000 NOT SHOWN

SOURCE - Regional Transit Travel Projection Project
(1970 preliminary run)

LEGEND

ZONE BOUNDARY

ZONE NUMBER

60

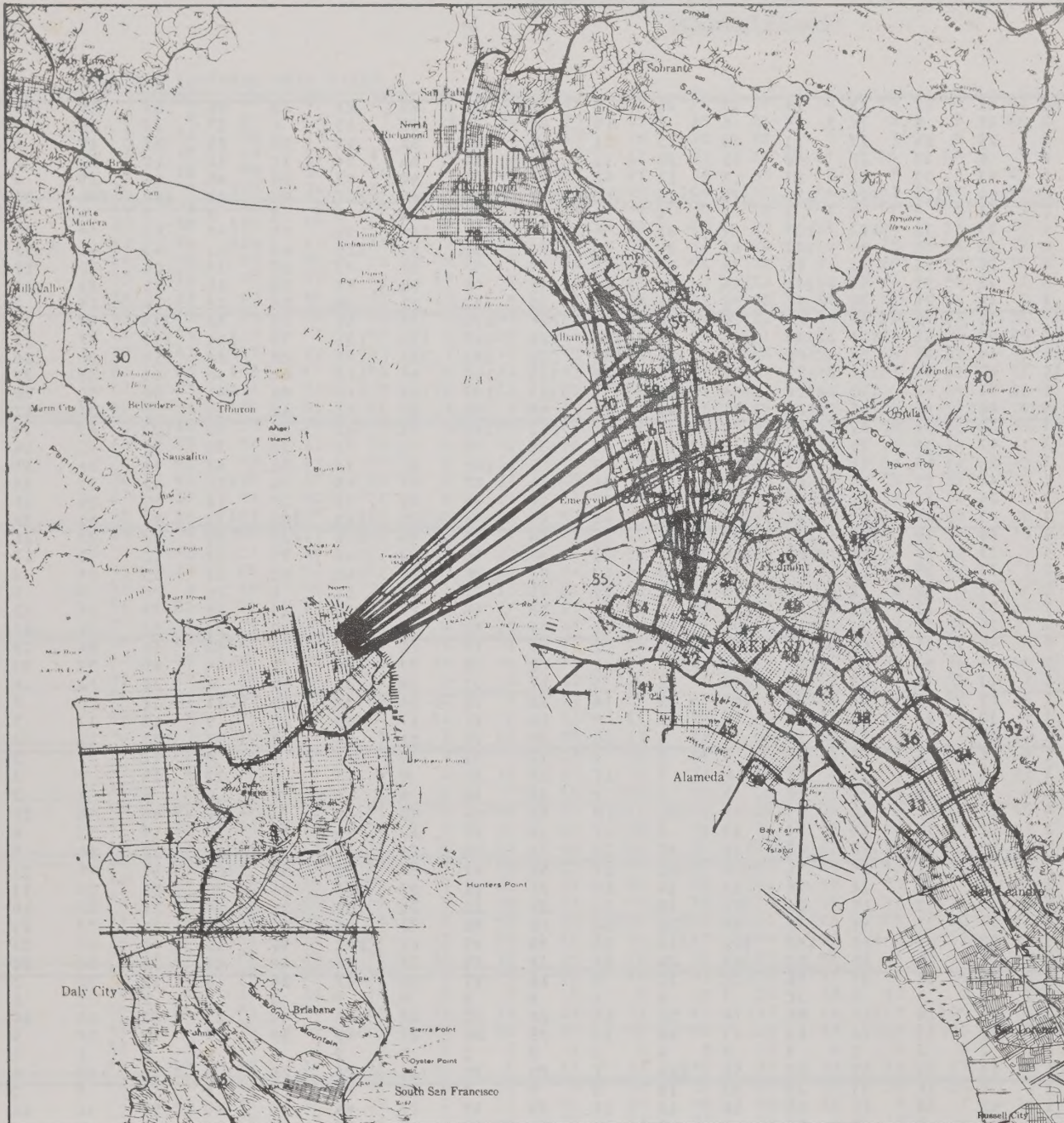


TABLE D-2

ADJUSTED INTERNAL TRIP TABLE

ADJUSTED INTERNAL TRIP TABLE

	1	2	3	4	5	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	5	6	2	10	2	10	8	10	15	6	4	15	26	21	11	12	6	25	32	14	5	
2	7	10	6	24	1	29	24	23	21	13	13	31	63	60	31	38	15	25	33	19	6	
3	3	7	8	7	2	8	17	23	48	32	20	12	21	19	24	34	31	10	11	12	6	
4	12	25	10	25	6	41	31	32	58	17	13	42	99	82	40	48	20	45	55	25	8	
5	36	34	32	140	0	162	125	121	158	75	53	160	331	332	164	202	90	117	158	106	39	
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
11	15	27	24	45	5	17	73	107	107	57	31	54	110	126	115	134	58	45	57	58	21	
12	10	25	23	32	6	35	71	69	122	61	24	35	80	76	51	120	69	31	40	41	21	
13	7	14	12	16	4	20	36	61	96	73	39	22	47	50	51	77	68	15	24	22	13	
14	6	14	29	17	3	23	35	58	136	94	71	22	48	48	53	85	78	16	25	21	12	
15	5	5	21	12	2	14	24	36	80	92	314	16	31	23	31	54	50	12	16	15	7	
16	25	50	15	88	15	15	58	80	121	25	22	79	206	158	75	90	39	56	113	47	18	
17	43	85	26	128	21	123	98	104	121	69	35	175	268	267	138	158	72	141	192	87	31	
18	27	68	20	85	16	84	92	81	108	57	22	107	220	184	125	134	65	84	114	86	36	
19	14	40	29	49	10	87	58	116	123	67	38	59	135	162	98	167	68	46	63	58	27	
20	14	35	32	44	8	51	82	112	150	84	49	53	111	117	120	160	68	41	56	52	30	
21	7	15	26	17	4	26	26	60	124	75	44	21	49	55	48	62	66	18	23	21	12	
22	45	32	14	61	7	57	38	42	47	23	17	88	151	113	51	62	26	70	122	43	14	
23	35	29	11	47	7	47	24	36	44	23	13	65	135	98	45	53	23	78	81	42	14	
24	23	25	15	30	7	55	49	57	65	21	18	39	92	108	62	76	31	41	64	36	15	
25	17	10	18	21	5	47	51	55	67	37	15	26	64	87	57	98	34	28	43	37	15	
26	9	11	11	15	3	24	31	45	54	28	17	17	38	49	42	78	27	16	21	25	13	
27	21	27	20	32	7	43	64	106	148	88	54	41	88	58	100	193	102	33	52	61	35	
28	18	22	51	27	7	47	62	107	220	132	86	25	74	93	74	163	128	29	37	37	26	
29	10	12	35	13	4	27	33	56	133	119	91	21	40	50	40	90	75	18	20	23	13	
30	6	7	19	9	2	13	19	31	65	77	147	12	27	28	26	46	41	11	13	14	8	
31	14	6	2	9	1	11	8	8	10	5	3	15	25	21	10	11	5	24	28	9	3	
32	24	14	6	18	3	21	22	22	29	13	9	25	52	49	27	32	15	38	58	34	12	
33	27	13	8	18	3	29	26	31	35	20	11	25	50	57	33	43	18	31	52	31	15	
34	31	18	12	24	5	48	55	65	72	42	25	32	66	85	65	97	39	42	64	54	28	
35	22	20	12	28	5	34	47	71	105	78	44	34	68	75	77	125	82	44	65	57	23	
36	6	6	11	8	1	11	16	22	50	31	20	9	17	21	19	35	34	8	12	12	6	
37	10	6	10	12	1	17	21	21	73	69	49	14	22	31	24	52	45	11	21	20	7	
38	5	5	14	7	1	10	12	20	52	50	52	9	16	21	17	33	30	9	13	11	5	
39	25	6	5	11	1	16	9	13	14	7	4	16	29	26	11	14	7	31	33	11	3	
40	7	2	2	4	1	8	4	7	6	4	2	4	12	11	5	6	4	8	12	3	2	
41	10	6	3	6	1	10	11	9	13	6	5	10	20	20	9	13	6	12	19	9	3	
42	4	2	2	4	0	7	4	6	6	5	1	6	10	10	4	6	5	6	9	4	2	
43	25	16	12	21	4	25	42	44	55	25	20	20	56	64	56	68	31	42	68	50	26	
44	12	4	6	6	2	12	15	17	21	11	8	10	18	27	16	24	10	12	17	11	8	
45	14	13	5	12	3	19	21	26	27	18	10	20	31	38	24	37	17	13	32	16	9	
46	26	15	5	22	3	17	20	25	30	28	22	27	51	47	54	76	42	38	53	45	22	
47	12	8	4	11	1	7	14	18	26	21	14	14	26	21	28	39	24	20	27	24	11	
48	12	7	3	11	1	5	12	15	24	21	13	14	25	20	26	32	24	19	27	22	10	
49	31	18	11	24	4	14	35	46	76	59	38	32	60	50	70	98	69	46	64	57	27	
50	22	24	29	23	5	20	47	65	143	101	64	28	59	63	61	102	96	35	48	37	23	
51	12	8	11	11	2	12	19	26	60	47	29	14	28	25	28	46	44	17	25	22	11	
52	6	4	10	5	1	5	11	15	40	28	17	8	16	17	15	27	24	8	12	10	5	
53	2	1	3	1	0	2	3	4	10	7	5	1	6	5	5	7	5	2	3	3	1	
54	8	10	14	11	2	12	18	27	66	74	52	15	26	27	28	46	43	13	22	19	10	
55	8	9	16	10	2	12	17	26	64	67	48	13	25	24	27	45	39	15	19	19	9	
56	0	1	2	1	0	2	2	3	7	7	4	1	2	2	3	2	4	1	1	1	1	
57	4	5	12	7	1	11	12	22	48	51	116	7	20	18	19	28	25	9	14	11	6	
58	3	3	7	1	1	5	10	11	25	23	18	5	9	7	10	17	13	3	7	4	2	
59	16	18	5	23	5	42	22	31	39	18	12	22	74	75	36	44	19	35	59	32	11	
60	12	5	2	7	1	13	8	9	13	4	3	10	21	18	8	12	6	18	22	8	2	
61	12	4	4	6	1	13	11	12	15	9	5	10	22	22	11	15	9	13	20	11	5	
62	4	2	2	6	0	7	4	5	6	3	2	5	11	11	4	5	2	6	10	4	2	
63	4	2	2	3	1	5	5	5	5	3	2	5	10	10	5	6	2	7	10	5	2	
64	6	2	1	4	1	6	4	5	4	4	2	4	11	10	5	7	3	7	11	5	2	
TOTAL	885	937	820	1354	221	1742	1900	2410	2702	2424	2012	1758	2555	2546	2574	2714	2219	1745	2424	1675	175	

TABLE D-2

ADJUSTED INTERNAL TRIP TABLE
(Continued)

ADJUSTED INTERNAL TRIP TABLE																								
	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48		
1	9	21	7	8	1	22	25	27	29	35	8	5	5	20	8	12	6	32	4	2	122			
2	14	32	13	5	2	11	15	18	20	28	7	7	4	5	5	8	3	17	3	3	84			
3	15	27	32	33	5	1	7	12	21	31	15	16	16	5	2	5	2	16	3	1	53			
9	18	39	18	14	2	20	24	23	26	39	8	8	9	15	7	11	7	24	3	2	130			
10	72	178	74	50	15	52	81	58	109	152	28	27	29	46	17	41	25	101	19	9	308			
11	2	5	2	1	0	1	2	2	3	3	1	1	1	1	1	1	1	2	0	0	8			
12	53	113	57	44	7	23	42	52	52	95	26	24	27	19	14	18	12	69	12	4	245			
13	54	124	67	50	7	16	27	39	72	94	30	25	22	17	11	15	8	50	7	4	228			
14	30	87	70	58	5	5	17	23	40	72	31	29	30	10	4	10	6	30	5	3	143			
15	31	58	77	65	17	9	16	25	42	101	40	54	56	12	3	9	5	35	5	2	206			
16	23	67	54	43	7	4	11	15	31	60	28	39	54	7	4	8	4	22	4	2	159			
17	23	74	54	27	5	46	45	45	44	72	19	14	18	34	10	24	12	49	6	4	229			
18	59	137	68	47	9	68	66	90	97	170	21	24	26	48	24	41	19	87	11	7	272			
19	61	129	62	47	7	46	63	78	102	104	30	24	27	36	19	31	15	78	11	7	290			
20	65	148	60	42	8	22	42	56	95	127	33	25	28	16	12	17	10	78	10	4	272			
21	85	214	65	72	10	21	35	50	101	162	46	37	39	20	11	18	10	71	10	8	406			
22	29	109	71	60	5	7	17	20	40	97	37	23	32	9	2	7	4	30	4	2	207			
23	25	57	74	19	4	68	65	62	64	84	17	12	15	55	15	28	15	70	8	4	266			
24	25	56	21	17	3	52	66	67	65	81	17	12	14	41	14	28	12	68	7	5	284			
25	42	97	31	20	6	25	54	55	83	107	22	16	16	20	10	20	10	78	7	5	321			
26	41	110	29	29	5	17	40	52	82	115	24	19	16	15	5	14	8	78	10	3	343			
27	29	56	40	30	5	11	24	31	64	103	24	18	19	9	6	10	5	50	6	3	293			
28	96	187	135	102	16	28	52	75	152	272	77	62	58	25	13	26	12	104	14	9	626			
29	77	264	133	138	28	18	43	52	110	293	100	99	88	15	8	18	10	101	9	5	592			
30	42	139	50	122	30	11	26	30	60	199	61	62	97	9	9	8	4	53	5	4	345			
31	25	80	61	101	27	10	14	21	42	92	39	63	82	7	8	8	4	35	4	3	214			
32	7	16	0	5	1	12	20	20	21	31	4	5	4	16	5	5	3	25	2	1	118			
34	22	50	21	17	3	34	29	53	62	72	16	14	12	28	19	31	16	67	9	5	292			
35	30	68	26	19	4	22	48	52	86	104	21	18	17	23	16	29	14	87	10	5	380			
36	68	162	64	46	10	35	71	98	158	260	53	46	42	51	17	44	18	178	23	10	883			
37	89	240	135	106	16	44	65	101	217	242	100	85	76	44	22	47	24	173	25	13	1041			
38	21	65	46	35	8	8	13	20	44	102	27	36	34	7	6	7	4	38	4	3	243			
39	25	52	78	102	22	5	20	30	69	147	59	82	82	16	6	16	8	63	10	6	320			
40	19	57	45	70	16	6	12	19	38	86	37	56	51	7	2	7	5	36	4	2	210			
41	9	23	8	8	1	25	26	21	26	42	7	9	5	11	10	12	7	37	4	3	189			
42	2	11	4	4	1	7	14	12	14	21	3	5	1	8	17	16	13	24	3	4	126			
43	5	20	6	4	2	11	27	23	31	41	7	7	6	13	17	23	18	49	8	7	302			
44	4	5	3	2	1	5	12	10	12	23	2	5	4	6	12	17	15	21	5	8	145			
45	52	112	52	41	8	46	75	102	178	208	44	43	38	45	33	67	30	160	34	13	896			
46	16	39	13	11	2	13	27	30	56	76	12	16	11	11	5	28	18	86	11	9	525			
47	17	54	23	18	5	19	40	42	72	105	17	18	12	23	27	62	76	105	28	39	734			
48	62	120	72	57	7	38	63	87	180	244	55	48	45	44	37	82	39	171	34	20	931			
49	29	68	45	33	4	20	31	43	88	114	33	30	26	23	27	45	42	84	2	20	522			
50	28	62	45	35	5	20	28	35	75	120	35	32	29	22	18	35	19	72	14	9	322			
51	76	189	152	65	5	45	67	100	207	421	105	85	80	52	35	63	33	166	26	16	1176			
52	64	192	158	141	33	34	51	74	155	478	150	160	131	31	23	44	23	162	28	14	1220			
53	22	86	79	71	12	18	26	36	76	169	65	76	64	17	14	25	14	78	14	7	512			
54	16	48	38	36	7	5	13	18	41	100	25	45	36	8	7	12	8	42	7	5	416			
55	5	11	11	10	2	3	4	5	11	29	10	12	9	3	1	8	1	12	3	2	143			
56	26	81	76	114	21	14	23	22	65	137	61	108	109	14	11	22	11	71	11	7	409			
57	24	74	65	105	20	12	22	30	60	132	57	100	103	12	14	21	10	67	11	8	448			
58	1	7	2	7	2	1	1	2	5	15	4	9	8	0	1	1	2	6	0	1	64			
61	15	53	36	72	30	6	11	17	40	87	33	66	77	6	4	13	4	45	5	5	290			
62	8	25	22	30	8	5	9	8	20	51	19	35	32	3	3	7	7	24	6	2	196			
63	20	46	16	13	2	22	41	27	44	59	12	9	7	16	7	12	6	39	4	3	156			
65	7	20	5	6	1	14	22	21	22	36	4	5	4	24	21	22	12	37	5	4	223			
66	8	26	8	6	2	12	27	28	36	54	9	10	8	12	12	27	17	60	10	6	344			
67	4	9	4	4	1	4	14	11	12	24	3	4	3	6	13	18	14	23	4	6	129			
68	4	9	4	2	1	5	13	12	12	18	5	3	2	6	14	15	10	22	3	4	132			
70	4	10	2	4	1	6	12	12	13	20	5	3	2	6	11	13	6	22	3	1	116			
TOTAL	1881	4867	2787	2667	538	1274	1931	2363	3954	6666	1523	2092	1959	1119	744	1337	777	3787	555	370	21078			

TABLE D-2

ADJUSTED INTERNAL TRIP TABLE
(Continued)

ADJUSTED INTERNAL TRIP TABLE

	49	50	51	52	53	54	55	56	57	58	61	62	63	65	66	67	69	70	TOTAL
1	54	80	87	16	14	1	4	9	10	2	2	4	12	9	12	4	8	5	996
2	43	56	59	15	12	1	2	11	10	1	3	4	19	5	6	4	4	4	1065
3	24	23	29	27	17	2	5	20	20	6	7	8	10	4	5	1	2	4	914
5	64	95	81	21	18	1	2	14	13	1	4	4	26	7	10	6	8	5	1540
10	184	199	226	61	62	9	8	65	52	8	21	12	104	27	33	25	25	22	5453
11	3	3	3	2	1	0	0	1	1	0	1	3	0	0	1	0	1	0	124
12	112	146	176	56	42	4	10	35	26	5	13	12	52	12	24	8	10	7	3176
13	59	122	149	55	39	4	9	35	34	6	11	16	25	8	17	8	9	7	2725
14	69	93	129	59	41	4	8	42	41	7	13	19	21	5	10	4	4	5	2373
15	113	171	189	82	63	6	12	88	85	10	24	20	18	5	9	4	4	4	2753
16	80	114	129	57	46	4	9	70	66	8	71	26	14	3	7	3	3	3	2275
17	114	153	167	57	32	2	2	25	25	2	9	12	54	16	21	12	10	12	3311
18	179	258	269	66	52	5	13	45	43	4	14	23	101	25	42	18	23	18	5044
19	126	172	179	59	46	4	10	36	37	4	13	17	85	18	34	15	19	14	2996
20	157	260	289	65	51	4	13	46	42	4	11	18	48	9	22	7	9	7	3942
21	189	254	208	82	64	6	13	54	57	6	17	18	44	11	22	6	9	9	4188
22	119	182	207	74	57	5	9	51	46	4	15	16	18	5	11	3	3	4	2495
23	145	204	222	42	36	2	5	26	27	2	7	9	60	26	25	13	15	14	3015
24	126	196	198	38	33	2	6	23	23	2	7	8	58	17	24	12	17	13	2726
25	166	228	252	48	41	2	8	33	24	5	6	3	45	12	20	6	11	8	2934
26	180	229	276	51	42	4	7	36	32	2	6	11	31	6	13	8	8	5	2955
27	138	191	214	45	39	3	8	30	28	2	7	12	16	5	12	4	4	4	2214
28	313	437	531	125	106	9	21	87	82	10	24	36	40	15	29	11	12	12	5473
29	265	552	732	212	189	18	31	159	146	10	37	44	27	8	25	10	8	7	6269
30	203	316	387	139	121	11	21	169	161	16	43	55	15	5	11	4	6	5	4019
31	127	192	222	98	81	7	14	116	109	17	59	46	11	4	9	5	5	5	2692
33	56	86	79	14	12	1	2	9	8	0	2	2	11	5	8	3	5	4	865
34	134	181	182	36	30	2	6	23	24	3	5	11	34	18	27	16	17	14	2163
35	183	252	261	48	41	2	8	32	20	1	9	9	29	12	21	13	16	12	2655
36	421	558	622	118	100	9	19	177	172	8	18	22	44	19	46	18	19	18	5508
37	463	740	1045	301	183	17	27	132	129	19	37	60	48	23	54	25	23	20	7518
38	142	217	280	99	72	6	14	61	57	5	15	23	9	3	11	3	5	3	2163
39	234	305	380	173	138	15	27	174	172	20	48	65	11	6	18	5	6	9	3507
40	124	203	219	50	78	7	14	115	110	12	34	42	5	3	10	2	4	3	2252
41	92	131	128	20	20	1	2	14	15	1	3	5	13	15	13	7	7	9	1271
42	103	96	90	13	14	1	3	9	10	2	1	5	5	13	12	11	15	9	328
43	157	166	139	24	27	2	7	18	19	2	4	8	0	12	24	16	17	11	1520
44	151	101	73	11	14	1	2	10	11	0	2	5	5	7	16	15	12	5	966
45	429	556	516	119	102	9	20	82	81	7	19	37	36	21	76	28	31	26	5295
46	299	334	229	46	46	4	13	32	25	2	8	15	11	10	31	13	13	10	2437
47	849	457	381	63	66	8	17	53	70	7	12	26	16	23	54	48	43	18	4164
48	471	467	2027	203	131	13	42	92	104	19	32	65	36	21	86	33	39	28	7394
49	295	346	466	129	105	12	41	67	92	20	32	66	19	18	52	20	26	16	7764
50	389	176	4582	165	116	12	37	71	82	19	30	52	19	16	40	16	17	12	7270
51	1038	988	882	270	226	19	51	131	131	24	44	76	44	30	69	25	34	25	8229
52	1547	1424	1485	363	414	47	76	201	257	31	76	113	20	23	50	19	23	17	10306
53	789	664	510	238	191	25	52	176	191	25	54	90	14	14	27	12	12	10	5392
54	747	592	337	143	159	15	42	141	166	21	44	71	7	6	15	6	7	5	2764
55	240	179	97	37	44	5	11	36	50	7	15	21	2	1	6	2	1	2	1129
56	572	465	337	166	202	25	45	255	301	51	109	157	12	10	25	10	12	9	4767
57	763	516	320	189	210	29	65	256	229	73	127	185	14	8	25	12	10	10	5100
58	114	90	45	16	21	3	8	37	52	6	16	27	1	0	2	1	0	1	625
61	525	361	263	115	148	22	47	244	258	49	240	126	7	8	11	8	2	7	3942
62	409	242	153	78	85	14	26	134	168	30	54	58	4	2	7	3	2	4	2170
63	197	147	140	24	21	2	3	17	15	2	4	6	23	8	13	7	9	7	1922
65	256	161	119	23	22	2	3	15	14	2	3	2	10	12	15	12	13	12	1417
66	402	222	172	35	30	3	5	24	24	1	5	7	10	11	19	13	13	9	1658
67	227	92	70	12	11	1	1	10	10	0	3	4	5	7	12	7	12	7	911
68	177	84	65	11	11	1	2	8	8	1	2	2	6	7	10	5	5	5	810
70	127	80	62	10	10	1	2	9	8	0	1	2	6	6	6	6	5	3	724
TOTAL	16640	16640	26809	5176	4448	459	1012	4237	4444	608	1552	1927	1524	689	1377	663	713	560	196544

The Berkeley Transit Project decided to use the model to estimate the potential ridership associated with improved local transit for several reasons:

- 1) The model was designed to simulate the individual behavior of people in response to improved levels of transit service, rather than projecting trends of modal split.
- 2) It requires limited data collection, and demonstrated accuracy in predicting modal split when calibrated in San Diego, Boston and the Bay Area.
- 3) It provided an explicit description of the modal share curves and their sensitivity to changes in the independent variables.
- 4) It is adaptable to estimating the share of travel amongst automobiles, transit, walking and bicycle trips, should Berkeley wish to undertake detailed patronage estimates later on.

Model Features

The structure of the model enables multi-modal split estimation by incorporating several properties.

- 1) The sum of the modal shares always equals one;
- 2) A given mode's share (i.e., percent traveling by that mode) decreases with increasing levels of that mode's service measures, e.g., travel time; and
- 3) The shares of other modes' increase with increases in the given mode's service measures.

In the Logit Model, the modal split of a given mode is given by:

$$w_m = \frac{\exp(a_i x_{im} + a_m)}{\sum_j \exp(a_i x_{ij} + a_j)}$$

Where:

- . x_{ij} is the i^{th} impedance attribute of mode j
(e.g., transit in-vehicle time);
- . a_{ij} is the calibrated coefficient corresponding to x_{ij} ;
- . and a_j is a calibrated mode-specific constant.

This formulation does not require that the same set of variables be used to define the transportation attributes of each of the modes. Further, the above formulation can be shown to hold when some of the x 's, in fact, are socio-economic variables, such as income.

When the model was developed, the data was stratified into two sets: travel to the CBD (Central Business District) and to non-CBD destinations. The Berkeley Transit Project used the CBD Model because it was felt to be more consistent with the major trip attraction of the University of California and the urban character of Berkeley.

The model requires both transportation variables (describing levels of transportation service by mode) and socio-economic variables. The information requirement for the version used by the Berkeley Transit Project is as follows:

1) TRANSPORTATION SYSTEM VARIABLES

- a) Automobile Excess Time: Total out of vehicle time, consisting of walking time at both ends of the trip, and any time required to park.
- b) Transit Excess Time: Walking time at both ends of the trip, plus initial waiting time.
- c) Line Haul Time: Total "in-vehicle" time, including transfer time in the case of transit.
- d) Cost: The cost of parking for automobile travel versus transit fares.

2) INTERMEDIATE VARIABLES

- a) Difference in Excess Time: Automobile Excess Time less Transit Excess Time.
- b) Difference in Line Haul Time: Automobile Line Haul Time less Transit Line Haul Time.

Model Sensitivity

For both the CBD and the non-CBD Models, the variable to which transit's ridership is most sensitive is Difference in Excess Time (a one minute increase in the automobile excess time or decrease in transit excess time results in roughly a four percent increase in transit's share of all travel).

Transit ridership is roughly one third as sensitive to Differences in Line Haul Time. Increasing parking costs or decreasing transit fares (Difference in Cost) has relatively little effect on transit ridership according to the model.

The estimation of Berkeley's transit ridership potential also varies roughly 10-20 percent depending on whether the CBD or non-CBD Model is used; patronage is higher with the CBD Model.

LEVEL OF TRANSIT SERVICE

The Berkeley Transit Project prepared detailed descriptions of the Level of Service provided by the existing transit system and the alternative proposals for improved service. Automobile travel times and walking times for comparable trips were also surveyed.

Levels of Service were prepared for representative trips from the twenty-one Berkeley neighborhoods to important trip destinations in Berkeley, such as the Downtown, U.C. Berkeley, the West Berkeley Industrial Area, Berkeley's high schools and shopping districts. Details of this analysis can be obtained from the City of Berkeley Department of Transportation

Existing Transit Service

A complete inventory of AC Transit's scheduled service in Berkeley was summarized onto the description of existing levels of service. Variations in the frequency of service are reflected in the travel time ranges shown in the tables. Generally adherence to schedule was such that schedules rather than actual running times were deemed adequate as a level of service measure.

Proposed Levels of Service

Levels of service associated with the proposed improvements to local transit were estimated as follows:

- 1) Average Walking Times to the nearest bus stop were derived from a comparison of routing and population density maps, assuming an average walking speed of three miles per hour.
- 2) Riding Times were calculated using AC Transit running times on comparable routes.
- 3) Transfer Times were calculated from the proposed frequencies of service (half a headway).

Automobile Travel Times

The Berkeley Transit Project obtained information on driving time from discussions with Berkeley's Traffic Department. An average neighborhood street speed of 11 miles per hour was assumed. Average parking delay times were estimated from experience. It was assumed that getting the car started and out on the street would take roughly an additional three minutes.

USING THE MODEL

The information about the transportation system in Berkeley, and the recommended proposal was converted into expressions of Difference in Excess Time and Difference in Line Haul Time. Tables 3 and 4 summarize this information for representative trips.

TABLE D-3

DIFFERENCE IN EXCESS TIME (DX)
Recommended Proposal

REPRESENTATIVE PRODUCTION ZONES	7th AND GILMAN		UNIVERSITY AND SAN PABLO		SOLANO AND COLUSA		TELEGRAPH AND HASTE	
	Auto/AC	DX	Auto/AC	DX	Auto/AC	DX	Auto/AC	DX
11			6/7	1	6/7	1	15/7	8
13	6/11	5			6/8	2	15/8	7
15	6/8	2	6/8	2	6/8	2	15/8	7
18	6/15	9	6/12	6	6/12	6	15/15	-
20	6/7	1	6/7	1	6/7	1	15/7	8
22	6/8	2	6/8	2	6/8	2	15/8	7
27	6/9	3	6/9	3	6/9	3	15/12	3
29	6/10	4	6/10	4	6/10	4	15/13	2
31	6/7	1	6/7	1	6/7	1	15/7	8
33	6/11	5	6/11	5	6/11	5	15/11	4
34	6/8	2	6/8	2			15/8	7
45	6/7	1	6/7	1	6/10	4	15/7	8
47	6/11	5	6/8	2	6/8	2	15/8	7
52	6/10	4	6/7	1	6/7	1	15/7	8
54	6/10	4	6/7	1	6/7	1	15/7	8
57	6/8	2	6/8	2	6/11	5	15/8	7
58	6/11	5	6/11	5	6/14	8	15/11	4
65	6/11	5	6/11	5	6/11	5	15/11	4
67	6/14	8	6/11	5	6/11	5	15/11	4
71	6/7	1	6/7	1	6/10	4	15/7	8

(1) Minutes of Auto Excess time/minutes of AC Transit Excess Time.

TABLE D-3

DIFFERENCE IN EXCESS TIME (DX)
Recommended Proposal
(Continued)

REPRESENTATIVE PRODUCTION ZONES	CEDAR AND SHATTUCK		7th AND CARLETON		HEARST AND EUCLID		BERKELEY HIGH SCHOOL	
	Auto/AC	DX	Auto/AC	DX	Auto/AC	DX	Auto/AC	DX
11	6/7	1	6/7	1	15/7	8	9/7	2
13	6/8	2	6/8	2	15/8	7	9/8	1
15	6/8	2	6/8	2	15/8	7	9/8	1
18	6/12	6	6/12	6	15/12	3	9/12	3
20	6/7	1	6/7	1	15/7	8	9/7	2
22	6/8	2	6/8	2	15/8	7	9/8	1
27	6/9	3	6/9	3	15/9	6	9/9	-
29	6/10	4	6/10	4	15/10	5		
31	6/7	1	6/7	1	15/7	8	9/7	2
33	6/11	5	6/11	5	15/11	4	9/11	2
34	6/8	2	6/8	2	15/8	7	9/8	1
45			6/7	1	15/7	8	9/7	2
47	6/8	2	6/8	2	15/8	7	9/8	1
52	6/7	1	6/7	1	15/7	8	9/7	2
54	6/7	1	6/17	11	15/7	8	9/7	2
57	6/8	2	6/8	2	15/7	8	9/8	1
58	6/11	5	6/11	5	15/11	4	9/11	2
65	6/11	5	6/11	5	15/11	4	9/16	7
67	6/11	5	6/11	5	15/11	4	9/11	2
71	6/7	1	6/7	1	15/7	8	9/10	1

TABLE D-3

DIFFERENCE IN EXCESS TIME (DX)
Recommended Proposal
(Continued)

REPRESENTATIVE PRODUCTION ZONES	ADELINE AND ALCATRAZ		ASHBY BART		KING JUNIOR HIGH		NORTH BERKELEY BART	
	Auto/AC	DX	Auto/AC	DX	Auto/AC	DX	Auto/AC	DX
11	6/7	1	6/7	1	8/7	1	6/7	1
13	6/8	2	6/8	2	8/11	3	6/8	2
15	6/8	2	6/8	2	8/8	-	6/8	2
18	6/12	6	6/12	6	8/12	4	6/12	6
20	6/7	1	6/7	1	8/7	1	6/7	1
22	6/8	2	6/8	2	8/8	-	6/8	2
27	6/9	3	6/9	3	8/9	1		
29	6/10	4	6/10	4	8/10	2	6/10	4
31			6/7	1	8/7	1	6/7	1
33	6/11	5	6/11	5	8/11	3	6/11	5
34	6/8	2	6/8	2			6/8	2
45	6/7	1	6/7	1	8/7	1	6/7	1
47	6/8	2	6/8	2	8/8	-	6/8	2
52	6/7	1	6/7	1	8/7	1	6/7	1
54	6/7	1	6/7	1	8/7	1	6/7	1
57	6/8	2	6/8	2	8/8	-	6/8	2
58	6/11	5	6/11	5	8/14	6	6/11	5
65	6/11	5	6/11	5	8/11	3	6/11	5
67	6/11	5	6/11	5	8/11	3	6/11	5
71	6/7	1	6/7	1	8/7	1	6/7	1

TABLE D-3

DIFFERENCE IN EXCESS TIME (DX)
Recommended Proposal
(Continued)

REPRESENTATIVE PRODUCTION ZONES	CENTER STREET BART		DWINELLE HALL		HEARST MINING CIRCLE		COLLEGE AND ASHBY	
	Auto/AC	DX	Auto/AC	DX	Auto/AC	DX	Auto/AC	DX
11	10/7	3	15/7	8	15/7	8	10/7	3
13	10/8	2	15/8	7	15/8	7	10/8	2
15	10/8	2	15/8	7	15/8	7	10/8	2
18	10/12	2	15/12	3	15/12	3	10/12	2
20	10/7	3	15/7	8	15/7	8	10/7	3
22	10/8	2	15/8	7	15/11	4	10/8	2
27	10/9	1	15/9	6	15/9	6	10/9	1
29	10/10	-	15/10	5	15/10	5	10/10	-
31	10/7	3	15/7	8	15/7	8	10/7	3
33	10/11	1	15/11	4	15/14	1	10/11	1
34	10/8	2	15/8	7	15/8	7	10/8	2
45	10/7	3	15/7	8	15/7	8	10/7	3
47	10/8	2	15/8	7	15/8	7	10/8	2
52	10/7	3	15/7	8	15/7	8	10/7	3
54	10/7	3	15/7	8	15/7	8	10/7	3
57	10/8	2	15/11	4	15/11	4		
58	10/11	1	15/14	1	15/14	1	10/11	1
65	10/11	1	15/11	4	15/11	4	10/11	1
67	10/11	1	15/11	4	15/11	4	10/11	1
71	10/7	3	15/7	8	15/7	8	10/7	3

TABLE D-3
 DIFFERENCE IN EXCESS TIME (DX)
 Recommended Proposal
 (Continued)

REPRESENTATIVE PRODUCTION ZONES	WILLARD	
	JUNIOR <u>Auto/AC</u>	HIGH <u>DX</u>
11	6/7	1
13	6/7	1
15	6/8	2
18	6/12	6
20	6/7	1
22	6/8	2
27	6/9	3
29	6/10	4
31	6/7	1
33	6/11	5
34	6/8	2
45	6/7	1
47	6/8	2
52	6/7	1
54	6/7	1
57	6/8	2
58	6/11	5
65	6/11	5
67	6/11	5
71	6/7	1

TABLE D-4
DIFFERENCE IN LINE HAUL TIME (DL)
Recommended Proposal

REPRESENTATIVE PRODUCTION ZONES	7th AND GILMAN		UNIVERSITY AND SAN PABLO		SOLANO AND COLUSA		TELEGRAPH AND HASTE	
	Auto/AC	DL	Auto/AC	DL	Auto/AC	DL	Auto/AC	DL
11			4/9	5	8/13	5	12/30	18
13	3/5	2			9/18	9	12/15	3
15	12/12	0	5/6	1	13/27	14	8/20	12
18	2/4	2	5/6	1	4/6	2	16/18	2
20	2/8	6	2/2	-	8/12	4	12/21	9
22	6/13	7	2/3	1	10/18	8	8/16	8
27	5/13	8	3/12	9	6/13	7	7/18	11
29	6/17	11	8/9	6	8/18	10	4/16	12
31	10/22	12	7/13	6	10/21	11	6/18	12
33	7/18	11	7/20	13	2/2	-	9/22	13
34	6/23	17	5/17	12			7/18	11
45	7/16	9	6/14	8	4/5	1	5/14	9
47	10/23	13	10/22	12	7/20	13	7/16	9
52	9/22	13	6/14	8	4/12	8	2/3	1
54	12/25	13	9/20	11	10/17	7	2/2	-
57	14/33	19	11/22	11	12/24	12	3/11	8
58	17/29	12	13/27	14	13/28	15	6/15	9
65	11/25	14	11/26	15	5/14	9	11/22	11
67	10/25	15	10/32	22	5/15	10	10/27	17
71	12/25	13	8/20	12	10/15	5	3/11	8

(1) Minutes of Auto Driving Time/AC Transit Line Haul Minutes.

TABLE D-4

DIFFERENCE IN LINE HAUL TIME (DL)
Recommended Proposal
(Continued)

REPRESENTATIVE PRODUCTION ZONES	CEDAR AND SHATTUCK		7th AND CARLETON		HEARST AND EUCLID		BERKELEY HIGH SCHOOL	
	Auto/AC	DL	Auto/AC	DL	Auto/AC	DL	Auto/AC	DL
11	7/14	7	5/7	2	9/24	15	8/22	14
13	7/16	9	3/3	-	9/11	2	6/7	1
15	10/22	12	2/3	1	14/22	8	7/17	10
18	8/16	8	8/13	5	12/28	16	10/17	7
20	4/7	3	4/12	8	9/13	4	6/13	7
22	8/17	9	2/2	-	9/17	8	4/12	8
27	3/10	7	6/16	10	9/16	7	4/11	7
29	6/15	9	3/11	8	7/17	10		
31	7/20	13	5/13	8	8/22	14	4/8	4
33	5/15	10	12/35	23	7/17	10	7/15	8
34	4/6	2	10/25	15	5/14	9	5/11	6
45			10/22	12	3/8	5	3/5	2
47	3/8	5	13/28	15	4/8	4	7/20	13
52	6/6	-	5/9	4	2/8	6	2/10	8
54	6/14	8	5/22	17	4/14	10	4/6	2
57	8/18	10	8/15	7	5/19	14	5/15	10
58	11/22	11	11/20	9	8/25	17	8/20	12
65	6/22	16	15/40	25	8/21	13	9/15	6
67	6/22	16	15/39	24	7/21	14	9/29	20
71	6/9	3	6/13	7	6/12	6	8/8	-

TABLE D-4

DIFFERENCE IN LINE HAUL TIME (DL)
Recommended Proposal
(Continued)

REPRESENTATIVE PRODUCTION ZONES	ADELINE AND ALCATRAZ		ASHBY BART		KING JUNIOR HIGH		NORTH BERKELEY BART	
	Auto/AC	DL	Auto/AC	DL	Auto/AC	DL	Auto/AC	DL
11	4/17	13	12/19	7	5/19	14	5/13	8
13	10/23	13	9/22	13	7/11	4	6/11	5
15	4/11	7	5/7	2	9/24	15	8/16	8
18	13/22	9	12/23	11	8/13	5	6/16	10
20	9/18	9	8/18	10	3/12	9	3/9	6
22	4/13	9	5/13	8	7/15	8	5/13	8
27	7/17	10	6/17	11	3/12	9		
29	4/13	9	4/13	9	5/16	11	3/5	2
31			1/3	2	7/16	9	7/10	3
33	11/22	11	10/21	11	3/6	3	6/23	17
34	10/19	9	9/12	3			4/17	13
45	8/18	10	7/12	5	2/9	7	4/10	6
47	11/28	17	10/10	-	7/16	9	7/17	10
52	4/9	5	2/5	3	5/16	11	5/17	12
54	5/18	13	5/14	9	7/18	11	8/17	9
57	4/15	11	3/6	3	9/24	15	9/22	13
58	7/11	4	6/10	4	12/29	17	12/26	14
65	3/37	24	6/37	31	6/17	11	9/28	19
67	3/37	24	12/32	20	6/21	15	9/30	21
71	2.8	6	1/2	1	8/18	10	7/22	15

TABLE D-4

DIFFERENCE IN LINE HAUL TIME (DL)
Recommended Proposal
(Continued)

REPRESENTATIVE PRODUCTION ZONES	CENTER		DWINELLE HALL		HEARST MINING CIRCLE		COLLEGE AND ASHBY	
	STREET Auto/AC	BART DL	Auto/AC	DL	Auto/AC	DL	Auto/AC	DL
11	8/19	11	12/26	14	10/22	12	14/23	9
13	6/14	8	8/15	7	8/16	8	12/19	7
15	9/19	10	8/18	10	10/20	10	9/13	4
18	10/21	11	10/27	17	11/22	11	15/28	13
20	6/16	10	5/21	16	8/12	4	11/26	15
22	7/15	8	6/17	11	8/18	10	8/14	6
27	4/12	8	6/23	17	5/17	12	9/23	14
29	4/10	6	5/16	11	7/18	11	7/18	11
31	5/10	5	7/19	12	8/23	15	5/15	10
33	7/13	6	10/22	12	9/19	10	13/31	18
34	5/24	19	5/8	3	6/18	12	12/21	19
45	3/4	1	5/10	5	4/10	6	8/19	11
47	6/3	3	6/10	4	5/11	6	8/22	14
52	2/3	1	2/9	7	5/9	4	5/9	4
54	4/11	7	2/4	2	2/15	13	2/4	2
57	6/13	7	3/12	9	4/23	19		
58	9/16	7	6/16	10	7/30	23	3/5	2
65	8/16	8	11/21	10	12/19	7	14/33	19
67	8/24	16	10/28	18	7/24	17	10/13	3
71	4/6	2	4/12	8	7/15	8	2/4	2

TABLE D-4

DIFFERENCE IN LINE HAUL TIME (DL)
Recommended Proposal
(Continued)

REPRESENTATIVE PRODUCTION ZONES	WILLARD	
	JUNIOR	HIGH
	Auto/AC	DL
11	12/30	18
13	10/22	12
15	6/15	9
18	13/20	7
20	10/19	9
22	8/9	1
27	8/22	14
29	5/13	8
31	4/15	11
33	11/34	23
34	9/23	14
45	6/15	9
47	7/25	18
52	2/2	-
54	2/9	7
57	2/9	7
58	5/27	22
65	12/25	13
67	13/29	16
71	2/8	6

The Adjusted Internal Trip Table was further compressed into an easily manageable number of zone pairs.

MODEL CALIBRATION

The developers of the N. Dimensional Logit Model felt that their model could be used without calibration to estimate work trips made by transit. It became apparent, however, that the model would significantly overestimate local transit usage (for all trip purposes) in Berkeley in an uncalibrated form.

Unfortunately, detail zone to zone travel data for transit trips in Berkeley was not available to individually calibrate the model for Berkeley. While data was not available which would allow the redefine the shape of the modal split curves in Berkeley, sufficient data did exist to identify how to shift the N. Dimensional logit curves so that they would correctly estimate existing patronage for the existing service conditions.

With only an estimate of total local ridership to work with the calibration exercise consisted of a proportionate (K) reduction of the uncalibrated model forecast using the mathematical relationship shown below:

$$K \left(\frac{120 \text{ sample zone pair trips}}{\text{All zone trips}} \right) = \frac{\text{Sample zone estimate of transit trips}}{12,000 \text{ local transit trips between all zone pairs}}$$

K = Constant

Obviously, this procedure merely shifts the modal split curves, rather than redetermining their shape. The 120 sample zone pairs were selected to be as representative as possible of the total 360 compressed zone pairs. Use of these sample zone pairs to calibrate the model yielded the set of curves shown in Figure 5.

MODAL APPLICATION

Using the set of modal split curves shown in Figure 5 and the measures of service described in Tables 3 and 4, modal split percentages were calculated for the 120 sample zone pairs. These modal split percentages were in turn applied to the total travel market between the respective zones and yielded an estimate of transit usage between the zone pairs. (Table 5) Lastly, the transit trips between the 120 sample zone pairs were summed together and proportionately increased to reflect total transit travel between all 360 local compressed zone pairs.

In estimating the ridership potential for trips to Berkeley from other places in the Bay Area, it was assumed that the combination of regional BART Service and the proposed Warren Freeway flier would minimize excess time at the "home-end" of trips coming to Berkeley and, therefore, that most of the variation in the Difference in Excess Time variable for these trips would result from the substantial improvement to transit service provided by better destination end connections (e.g., significant improvements to transit connections from Berkeley BART Stations to the West Berkeley Industrial Area and Campus.

Trips with neither an origin or destination within the study area, but attracted to transit by Berkeley's service improvements were estimated on a straight line basis using a conservative slope. Trips in this category include those from El Cerrito and North Oakland to Downtown Oakland. A ratio of 1.0 new passengers to each new revenue mile of service was employed. AC Transit's corresponding ratios for the East Bay and for its entire system are approximately 2.3 and 2.0 revenue passengers per mile respectively.

FIGURE D-5
MODAL SPLIT CURVES

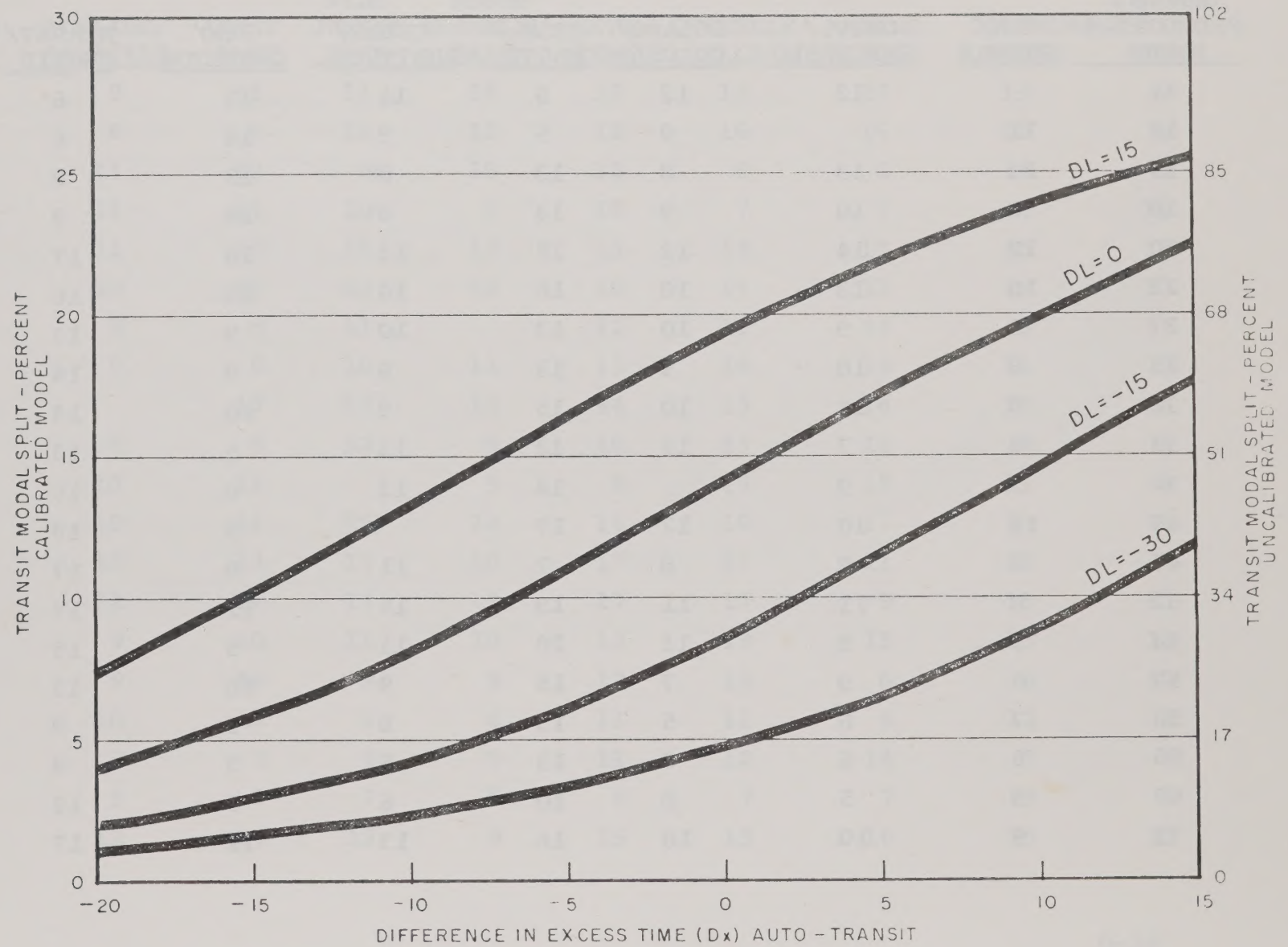


TABLE D-5
 REPRESENTATIVE MODAL SPLIT PERCENTAGES
 Recommended Proposal

REPRESENT- ATIVE PRODUCTION ZONES	7th/ GILMAN	UNIV./ SAN PABLO	SOLANO/ COLUSA	TELE./ HASTE	CEDAR/ SHATTUCK	7th/ CARLETON	HEARST/ EUCLID	BERKELEY HIGH
11		12	12	5	11	13	6	11
13	11		9	5	9	14	6	14
15	13	13	8	13	8	13	8	10
18	8	10	9	13	8	14	9	10
20	12	14	12	15	13	10	17	13
22	10	13	10	16	10	13	16	13
27	9	9	10	13	10	9	15	12
29	8	10	9	13	9	9	14	
31	9	12	10	15	9	10	14	14
33	8	7	12	13	13	5	13	9
34	7	9		14	13	8	15	13
45	11	10	12	17		9	18	15
47	7	9	8	7	11	8	17	10
52	8	11	11	19	15	12	17	13
54	7	9	11	20	11	5	15	15
57	6	9	7	15	9	10	13	11
58	7	6	5	13	8	8	9	9
65	6	6	8	13	6	3	8	8
67	5	5	8	10	6	5	12	5
71	9	10	10	16	13	11	17	15

TABLE D-5
 REPRESENTATIVE MODAL SPLIT PERCENTAGES
 Recommended Proposal
 (Continued)

REPRESENT- ATIVE PRODUCTION ZONES	ADELINE/ ALCATRAZ	ASHBY BART	KING JUNIOR HIGH	NORTH BERKELEY BART	DOWN/ TOWN	DWINELLE HALL	MINING CIRCLE	COLLEGE/ ASHBY	WILLARD JUNIOR HIGH
11	9	11	11	11	12	12	13	13	7
13	8	8	11	12	12	16	15	16	8
15	11	12	9	10	12	6	6	14	9
18	11	11	10	6	10	7	9	9	14
20	11	10	11	12	13	13	17	10	10
22	10	10	12	10	10	15	12	13	13
27	9	8	11		12	13	13	9	11
29	9	9	10	11	13	14	14	11	9
31		13	12	13	14	15	14	13	10
33	9	8	12	5	10	13	12	8	4
34	10	12		9	8	17	15	11	9
45	10	11	15	12	16	18	17	13	11
47	12	14	11	10	17	17	11	10	7
52	12	12	11	9	17	17	9	15	15
54	9	10	11	10	13	19	15	15	11
57	9	12	9	9	13	13	6	8	10
58	10	10	5	6	11	11	6	13	4
65	3	3	9	5	11	12	14	7	8
67	5	5	7	5	8	7	7	13	6
71	12	14	12	9	15	13	16	15	12

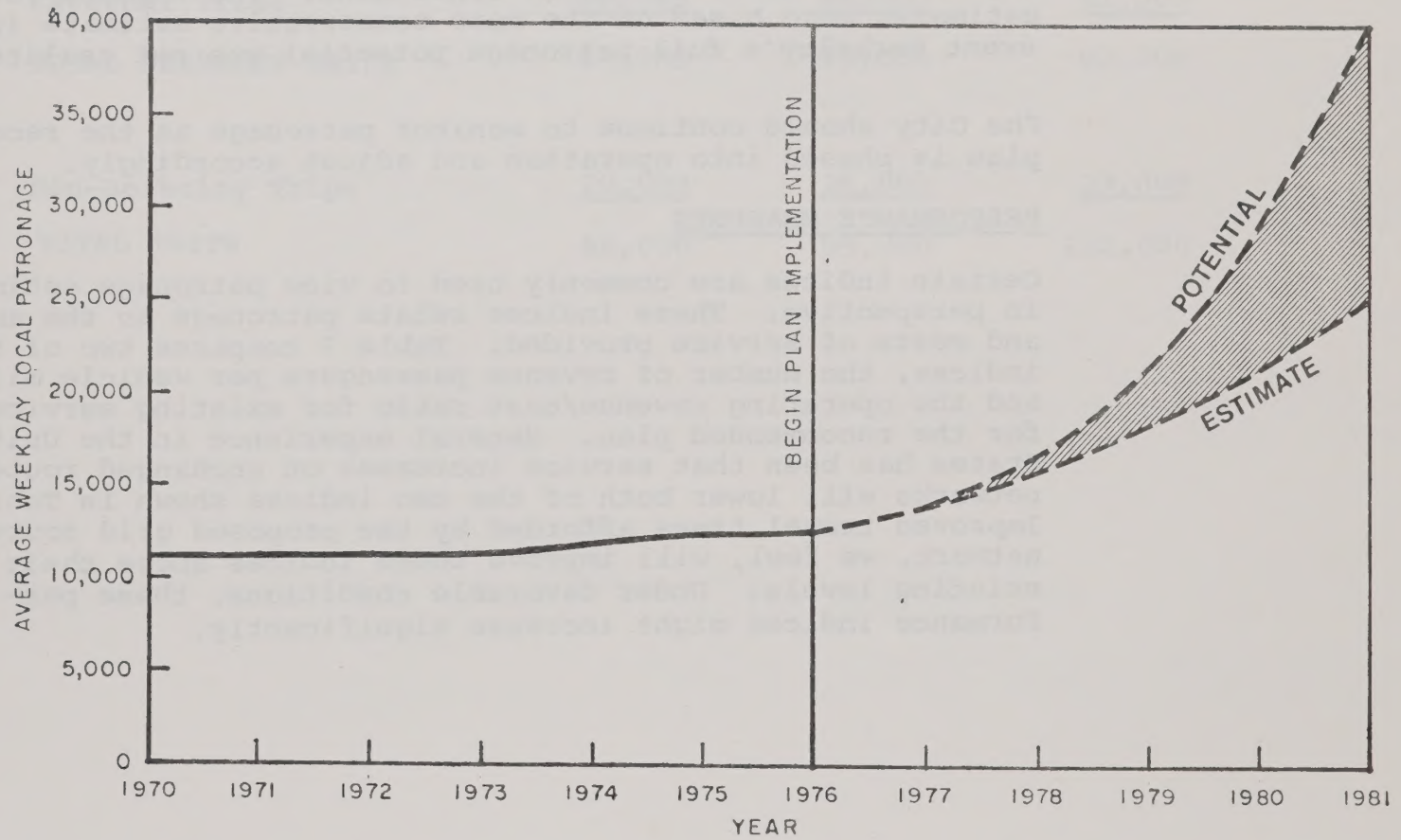
A background patronage growth rate of three percent annually was added to these estimates of local external and non-Berkeley Weekday patronages. Evidence exists which indicates that patronage which had declined, then stabilized has recently been increasing at about this three percent rate.

RIDERSHIP POTENTIAL

The recommended plan significantly improves local transit in Berkeley, in some cases reducing travel time by one hour or more. The N. Dimensional Logit Model reflects these service improvements in an increase in transit's share of local trips to 12 percent of the total trips (excluding walking trips). By making better connections and by proposing better service between Berkeley and nearby communities, it also could increase transit's share of travel into and from Berkeley to about 15 percent.

In essence, the model predicts a doubling of local transit usage. The unique nature of the Berkeley community could, however, realize a tripling of local transit usage under the proper conditions. The dominant influence of U.C. Berkeley on travel patterns not only provides a mechanism for encouraging transit usage but due to the four year student graduation cycle allows a major change in travel patterns to be accomplished within a five-year period. Community support of a comprehensive traffic and parking management plan, aggressive marketing, and a fully operational BART system, we feel, could produce 40,000 local transit trips per day or nearly 20 percent of the local automobile/transit travel in Berkeley.

FIGURE D-6
LOCAL TRANSIT PATRONAGE PROJECTION



Thus, the general patronage analysis undertaken by the Project suggests that implementation of the proposed plan could significantly impact local travel in Berkeley. The extent of the impact will be largely dependent on community support of its goals to reduce automobile traffic. Recognizing this, two estimates of patronage were prepared for the recommended plan. The first estimate is based on the results of the N. Dimensional model calibration analysis described earlier. It is more conservative than the second estimate as shown in Figure 6 and Table 6. The second, more optimistic estimate describes the potential patronage which might result under favorable conditions. The farebox revenue estimates were based on the more conservative estimate in the event Berkeley's full patronage potential was not realized.

The City should continue to monitor patronage as the recommended plan is phased into operation and adjust accordingly.

PERFORMANCE MEASURES

Certain indices are commonly used to view patronage estimates in perspective. These indices relate patronage to the amount and costs of service provided. Table 7 compares two of these indices, the number of revenue passengers per vehicle mile and the operating revenue/cost ratio for existing service and for the recommended plan. General experience in the United States has been that service increases on unchanged route networks will lower both of the two indices shown in Table 7. Improved travel times afforded by the proposed grid route network, we feel, will improve these indices above their existing levels. Under favorable conditions, these performance indices might increase significantly.

TABLE D-6
FIVE YEAR TRANSIT PATRONAGE PROJECTIONS
Average Weekday

	<u>EXISTING 1972-1973</u>	<u>ESTIMATED</u>	<u>POTENTIAL</u>
Local Trips	12,000	25,000	40,000
External Trips	<u>36,000</u>	<u>48,000</u>	<u>53,000</u>
TOTAL BERKELEY TRIPS	48,000	73,000	93,000
Non-Berkeley Trips	<u>20,000</u>	<u>26,000</u>	<u>29,000</u>
TOTAL TRIPS	68,000	99,000	122,000

TABLE D-7
ESTIMATED 1981 PERFORMANCE MEASURES

	<u>REVENUE PASSENGERS PER VEHICLE MILE SERVICE</u>	<u>1981 OPERATING REVENUE/COST</u>
EXISTING SERVICE	3.6	0.45*
ESTIMATES	3.7	0.36
POTENTIAL PATRONAGE	4.5	0.44

* Assumes a higher average fare based on continued emphasis of Transbay Service.

FOOTNOTES

- 1) The Neighborhood Traffic Study, DeLeuw Cather, 1974, estimates about a one percent annual growth in traffic 1964 to 1972; Berkeley's transit ridership has not increased significantly during the last 15 years either.
- 2) There were no proposals for new housing or commercial development in Berkeley at the time those estimates were made that would create sizable increases in traffic.
- 3) Implementation of the N. Dimensional Logit Model, Final Report, prepared for San Diego CPO by Peat, Marwick, Mitchell and Co., May, 1972.
- 4) The Berkeley Transit Project maintained a card file of activities surveyed, which has been given to the Berkeley Planning Department.
- 5) 1970 Census data and information compiled by the Berkeley Planning Department for Plan Revision were used.
- 6) The detailed printouts of RTTPP travel estimates can be obtained from the Metropolitan Transportation Commission, Hotel Claremont, Berkeley.
- 7) DeLeuw Cather and Company, 1973.
- 8) Peat, Marwick, Mitchell and Company op.cite.
- 9) For example, see Characteristics of Existing Transit Service on College Avenue, G. Thompson, Berkeley Planning Department, September, 1974, Figure 6.

APPENDIX (1)
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